Cine Film to Video for 8mm, 9.5 mm, and 16mm Cine Films -- Help

(Version 3.0 - February 2017   © Wolfgang Kurz, 2011, 2012, 2014, 2015, 2016, 2017)

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Introduction

CineToVidPro is a program which allows to extract the images (frames) of 8 mm, 9.5 mm or 16 mm cine films in order to create a video from this frames. For 16 mm cine films with optical sound, the sound tracks can also be digitized.
To do this, the cine film has to be scanned in short strips (from 5 cm up to 20cm / 2 to 8 inch length, dependent on the transparency unit -TPU- width of the used scanner) with a high resolution (minimum 2400 dpi) flatbed scanner.
Special features of CineToVidPro are:

  ◦ a frame border correction to adjust border jumps to a large extend which are caused by curled filmstrips
  ◦ as well as a function which allows to almost eliminate vertical scratches, created by film projectors when showing the film.

Prerequisites

CineToVidPro is a **C#** (C Sharp) program that uses the Microsoft .NET Version 4.0 or higher class libraries. To use the product effectively it is very desireable to exploit a fast computer preferably with a multi core processor. Also essential is the provision of sufficient main storage. 3 GB for 32 bit operating systems, or even 4 to 6 GB for 64 Bit operating systems is very desireable.
As from a cine film usually a lot of frames have to be extracted (86400 frames for a one hour film taken with 24 frames/sec) also sufficient disk stroage is required.
If the various frames of a video shall be stored as PNG files (Portable Network Graphics - a lossless compressed image format), than the "OptiPNG (Vers. 0.7.5 - as of 2016/03/24)" tool is needed. PNG images need at least more than 10 times of storage compared to lossy compressed JPG images.
To finally create a MPEG video from the frames the freeware product FFmpeg (see http://www.FFmpeg.org/) must be installed.
Alternatively you can also use VirtualDub (see http://www.virtualdub.org/) and AviSynth (see here) to generate the video as AVI file.
To view the INI file, the error file and the LOG file a text editor (e.g. NotePad++) is required.
It is also good practice to install an image viewer(e.g. IrfanView). To view the generated MPEG videos I recommend VideoLan .

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Installation and Invocation of Cine Film to Video (CineToVidPro)

The **CineToVidPro** program is provided in compressed form as a .ZIP file. To install it, it is sufficient, to decompress the file into a library of your choice. It is recommended to use the standard system program library together with a sublibrary called CineToVidPro e.g. **C:\Program Files\CineToVidPro**.
CineToVidPro requires a library to store the projects. In this directory for each project a subdirectory is created with the name of the 4 character project

identification. In this subdirectory the scanned film strips, the extracted frames and the created videos are stored.
In addition the project's **INI file** and if necessary the **LOG file** and the **error file** are stored in this subdirectory.

To call the program you can generate a desktop link to the program exe file.
In the properties dialog of this link you can specify as first program argument your preferred language. (e.g. EN for English, and DE for German). You can also provide as second argument an instruction to center the main window on the screen (**CW** for Center Window or **NC** for No Window Centering). If the desired language is not specified in the invocation command, then a language selctor window is presented before the real program invocation. In this dialog window you can selct your preferred language.

Implemented are currently (March 2016) the languages Englisch and German. There may additional languages are coming up. French, Italian, Spanish, Portuguese, Dutch and Polish could be provided, if someone is willing and able to do the required translation of the text components and the Help file.
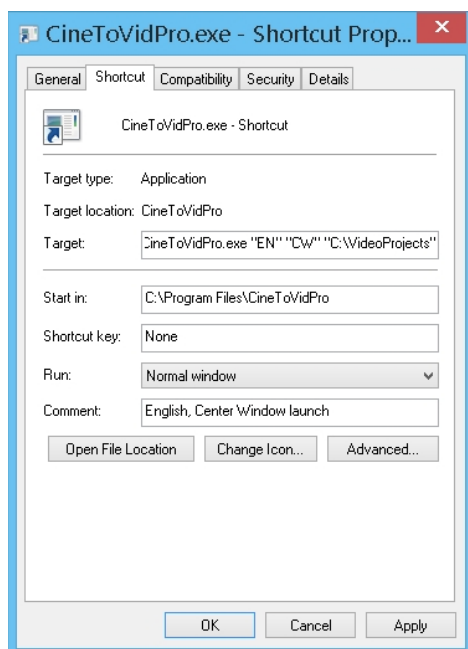
If the directory for the video projects should be not allocated in the basic CineToVidPro directory you can provide the path to this project directory as the third element of the program argument list.
Finally you can specify whether a trace should be enabled (1) or not (0) as well as the screensize in case a non common screen has to be used (minimum screen size required is 1024 x 768 pixels).
Example for the argument list: **"EN" "CW" "C:\VideoProjects"** (Annotation: The double quotes are only required if spaces exist in an argument value.)
Under *"Execute in" [Ausführen in]"* in the link, the installation directory must be provided as current library, e. g. "C:\Program Files\CineToVidPro" .
Via the button *"change symbol" [Anderes Symbol]*" you can associate to the link the product logo provided in the installation library .
See the following picture: .

General Hints

To use the disk storage economically, the scanned film strips are stored either in the .JPG format (lossy compressed images) or the .PNG format (lossless compressed images). But keep in mind: PNG needs up to 10 times more disk storage than JPG.
Also the extracted frames are stored either in the JPG (JPEG) format or the PNG (PNG_ZIP) format. For JPG CineToVidPro allows the determination of a JPG quality factor. This means: quality high (100) large files, quality poor (0) smaller files.

The file names of the scanned strips have a special format.
The file name starts with a 4 character long project identification (e.g. "TEST"). This project identification follows a figure ("0" to "9"). This figure identifies a group of strips. It also determines a subdirectory within the directory to store extracted frames (..../FRAMES). "0" therefore means: the extracted frames from strips of group 0 are stored in subdirectoy ..../FRAMES/0/, "1" means the extracted frames are stored in ..../FRAMES/1/ and so on. This is to limit the number of files in a directory, because the addressing of files in directories containing more than 10000 objects slows down significantly.
Than follow 3 digits (000 to 999) as a consecutive number of the strip within it's group, and after that follows the file extension, that is ".jpg" or ".png" to identify the file as a JPEG or PNG compressed image.
To ensure that later on, when generating MPEG videos, no problems arise, the **first strip** always should end with the character sequence **XXXXy000.jpg**

respectively with **XXXXy000.png**
(**XXXX** stands for the project identification and **y** stands for the subfolder name 0 to 9).

The extracted frames are stored in the corresponding group subdirectory according to the following naming convention: The first 5 characters of the frame file name are identical to the corresponding strip file name. Then follows a 6 digit long sequence number within the group. The image files in a frames group directory (in the example group 5) therefore are always named e.g. like this: "TEST5000000.jpg or TEST5000000.png" (first frame) up to "TEST5999999.jpg or TEST5999999.png" (highest possible number within a group).
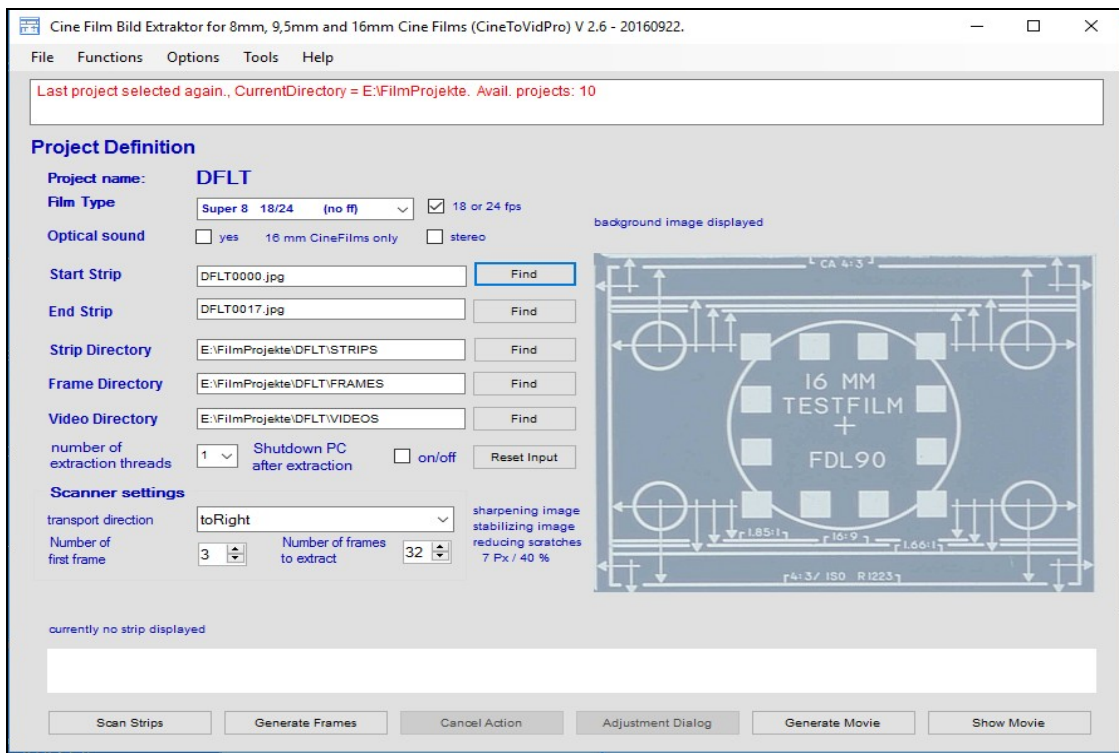
Preparation Steps

First Call

When **CineToVidPro** is called the very first time, the program creates a **"project base file"** in the installation directory or in the directory provided by the path submitted as third invocation argument. This file gets the name **"Projects.txt"**. This file must not be moved to a different directory and the name must not be changed. In this file the anchor entries for the CineToVidPro video projects are stored. Each project is represented as one line. In this file later on also the path to the selected tools is stored to allow them to be used application wide.
The file can be edited with a standard text editor like NotePad++ but it must be taken care not to destroy the format of the line. The first 4 characters in the line are the *project name*. Then follows a blank. After the blank follows a *short project description* to ease the identification of the project. The short identification is terminated by a semicolon - that means the short discription can not contain a semicolon. After the semicolon follows the *path to the project directory*. In the base project directory all projects are represented as a subdirectory with the 4 character project id as name. Also in the **"project base directory"** a folder with the name *"AviSynth_Scripts"* is located. It contains a subfolder called **"plugins"** in which AviSynth and VirtualDub expects their plugins to be stored. Here also all generated *.avs files* will be stored which are used to generate the videos exploiting VirtualDub.
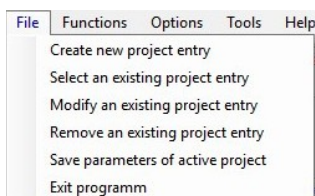It is possible to define different base project directories for different projects.

When **CineToVidPro** is invoked, the main window appears. The window bar of this main window shows, which version of the product is installed.

The main window is the control center of the application. Via the menues and buttons you can trigger the various functions of the application and via the input fields you can set the basic files and folders needed to perform these functions. Here also the Scanner Settings are specified. This is the number of frames advanced in the scanner, the first frame to extract in the strip and the grey value for sprocket hole detection.
In addition the main window is the place, where the progress of a frame extraction is presented.

The File Menu:

Creation of a New Project

The first step to create a video from a cine film is the creation of a project.
To do that, via menu *"File->Create new project"* the **Create new project dialog** has to be invoked. The following window opens:
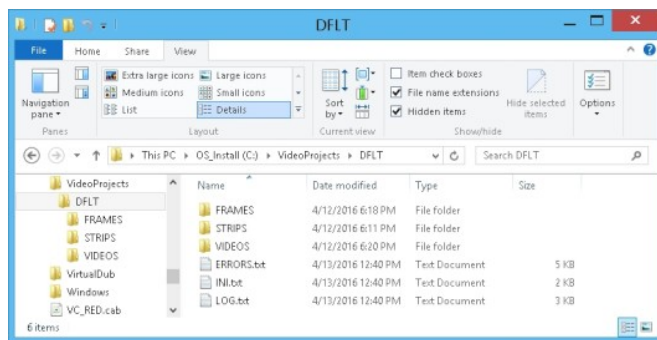
First you have to type into field **Project ID (4 characters)** a meaningfull abbreviation for the project as the *"project identification"*. This project ID should describe the project briefly e.g. **IT07** for "Vacation in Italy 2007". Then a short description for the project should be given in field *"Project Description (40 char)"* e.g. "Vacation in Italy 2007". With this short description the project easily can be selected from the list of available projects later on.

Finally you have to specify the **Base Directory** of the project group. This can be done either by entering the path manually into field **Base Directory for this Project** or the base directory can be taken from an existing project *(via selection of an entry of the **"Template Project"** list)*, or it can be evaluated by the standard system directory selection dialog via button *"Find Base Directory"*.

With button "Cancel (Quit)" the dialog can be cancelled.

Via button "Return (OK)" the input will be confirmed and a new project with this values will be created.

In this case in the **project base file** a new entry will be generated and in the selected **project base directory** a new subdirectory with the project id as name will be created. In this project directory then 3 additional subdirectories are created, one for the storage of the scanned strips (STRIPS), one for the extracted frames (FRAMES) and one for the generated videos (VIDEOS) and sounds (if available). The project directory will also be the place, where the project's **INI File** and if necessary the project's **LOG File** and **Error File** will be located. See directory structure in the following picture:

Selection of an Existing Project

CineToVidPro automatically starts with the project that was active at the end of the preceeding session. But you can at any time via menu entry **Select an existing project entry** switch to a different (already existing) project.

Only if a project has been selected you can work with the project. (*Note: the function "creation of a new project" does **not** include the selection.*)
Via the selection most of the function menus and function buttons become enabled. Also all the values stored in the project's INI File will be imported.
To the project selection you get via *"File -> Select an existing project entry"*. It opens the following window:

In drop down field *"Available projects"* the descriptions of all available projects are shown. When you click onto one of this entries the associated project will be selected.
Via button *"Return"* the project finally will be activated. From this point in time the menu entries und function buttons become available.

Via *"File -> Modify an existing project entry"* (showing also this dialog) you can change the project entrie parameters.
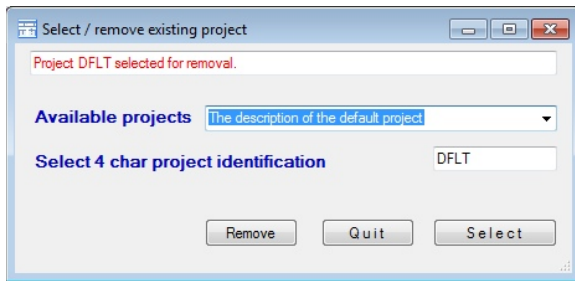
Deletion of an Existing Project

Via menu item *"File -> Remove an existing project entry"* the dialog to delete an existing project will be called.
Via drop down field *"Available projects"* (as in the project selection dialog) all available projects are listed. By selecting the relevant list entry and clicking the *"Remove"* button an inactive project will be removed from the list of avaliable projects. The active project cannot be removed! You must first make a different project the active project! **Not removed** will be all data (strips, frames, and videos). These data must be discarded manually if they became obsolete.
With button *"Quit"* the dialog will be cancelled (no removal happens) and with button *"Return"* the dialog will be disposed.

Save Actual Project Parameters to INI File

Via menu item *"File -> Save parameters of active project"* you can save at any point in time the currently active project parameters to the projects **INI File** in the project directory.
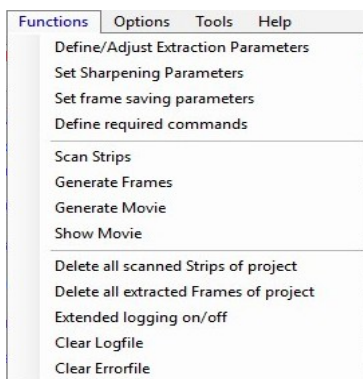
Exiting CineFilm to Video (CineToVidPro)

Via menu item *"File -> Exit program"* the CineToVidPro application will be terminated. If currently a frame extraction is ongoing, exiting the application is postponed and the extraction will be cancelled. After the extraction has been finished, you can leave the application via the **File -> Exit program** menu item. During termination the active project parameters will be saved to the project's **INI File** in the project directory.

Project - Execution Steps
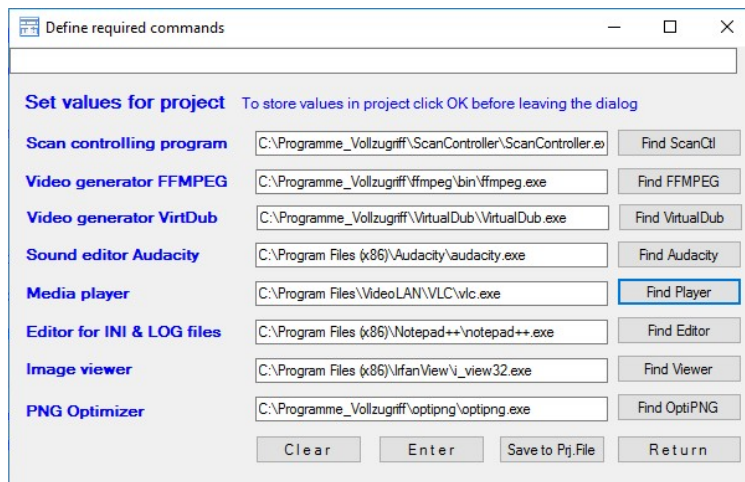
The Function Menu:

Define Image Sharpening Parameters

If the extracted images should be sharpened again, than the sharpening parameters have to be set via the function **"Set Sharpening Parameters"**. Parameters are the radius of the bluring mask, the contrast modification and the difference of the color between pixels to trigger color changes. Values of 3 to 5 for the radius, 1,0 to 1,5 for the contrast and 5 to 8 for the color difference result in reasonable sharpening results.

Define required Commands

During project performance there are several supporting programs and files needed which have to be defined, so that the program can find them. These definitions are done with the **"Define required commands"** dialog. This dialog is invoked via menu item *"Functions -> Define required commands"*. When this menu item is selected, the following dialog window opens:

The dialog is used to set the path to the needed object. The search for the object's path is supported by the systems file selection dialog which can be invoked for each object with the associated **"Find ...."** button.
The following objects must be defined (you can select different objects for each project):

1. The scan controlling program - normally the **"ScanController"**
2. The movie generator program **FFmpeg** to generate the mpeg movie file(s) from the extracted frames.
3. The movie generator program **VirtualDub** to generate with the assistance of AviSynth Scripts the AVI Video files from the extracted frames.
4. The sound editor program **Audacity** to convert the raw PCM sound data to the WAV format.
5. The media player to show the generated movies. Recommended is **VideoLAN VLC**
6. The text editor to show (or modify) the project LOG file, the error file or the project INI file. Recommended is **NotePad++**
7. The image viewer to show scanned strips or extracted frames. Recommended is **IrfanView**.
8. The "OptiPNG" tool to store strips or extracted frames in optimized PNG Format..

To reset the dialog input fields press the **"Clear"** button, to **confirm** the selected input, press **"Enter"** and to exit the dialog, press **"Return"**. The input can only be used, if it has been confirmed before the dialog has been endend. Pressing the **"Save to Prj.File"** saves the selected values to the Project File. By that the values become **global values** which remain the same for all projects and are used if no values are provided in the sample INI File selected by a template project if a new project is created.
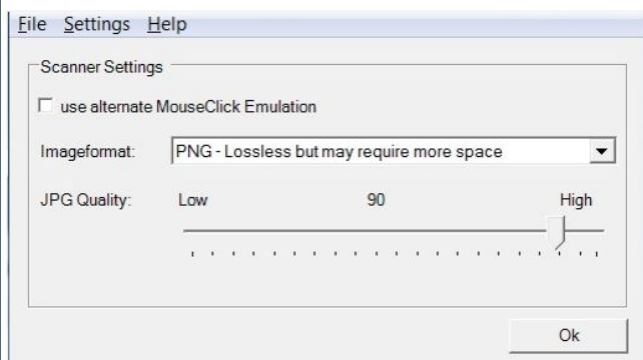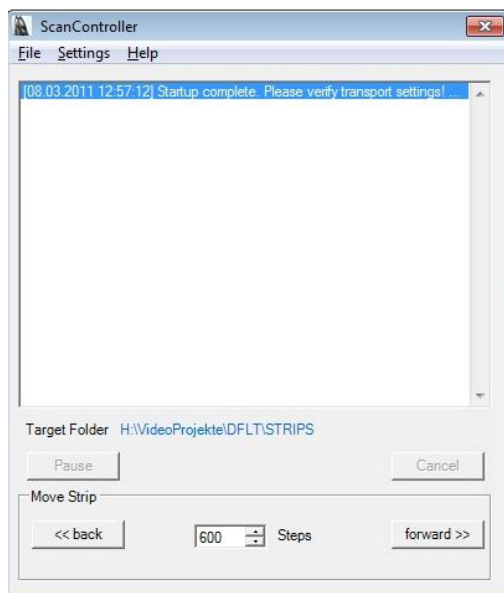If the **"Enter"** button is not hit, the old values stay in effect.

Scan the Film Strips

After a project has been created and/or selected for processing, from the original cine film the strips from which the film frames have to be extracted must to be scanned using a flatbed photo scanner.

The scan process is called from the CineToVidPro main window via menu item *"Functions -> Scan Strips"* or button **"Scan Stips"**. The program, that has been defined in the "Define required Commands" is invoked. This is normaly the **"ScanController"** that supports automated transport and scanning of the cine film through the flatbed scanner (see ScanController Help and the CineToVid Wiki)). CineToVidPro provides the required project parameters (project ID and strip directory) to the ScanController.
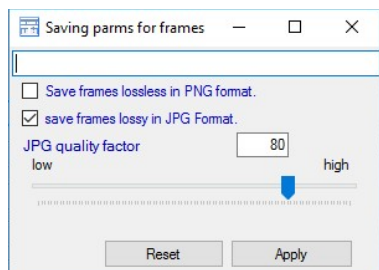
Annotation: If you want to scan your strips uncompressed, please be aware, that only a 24 bit color resolution is supported for PNG. The decission how to scan (JPG or PNG) is made in the ScanController setting dialog.

As first activity after the strips have been scanned it should be determined, what image format should be used to store the frames and - if necessary - what quality the extracted frames should have. This is done via the dialog **"Set frame saving parameters"**.
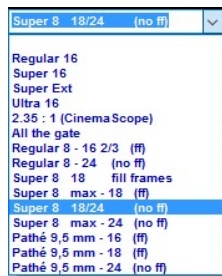
Set frame saving parameters

In this dialog you specify, whether the frames should be stored in PNG format or in JPG format. The frame format is independent from the selected strip format. If JPG format is selected, you can in addition specify the desired quality factor of the frames to reduce artefacts.

Define/Adjust Extraction Parameters

After the strips are scanned the film type for this strips has to be selected.
Annotation: For all film types (because of FFmpeg) either 24 or 25 frames per second are used. If VirtualDub is used to generate the movie, also 18 frames per second can be used. But to show such a film on a TV set it must be converted to a 25 frames/sec format. For Super8, Pathé 9.5, and Regular8 the needed filling frames are generated automatically if this is mentioned in the selection (ff = fill frames). If you want to use for Super8 18 or 24 fps or Regular 8 16 2/3 or 24 fps without fill frames (because you want to apply a dust cleaning filter) you have to select **"Super 8 18/24 (no_ff)"** or **"Regular 8 - 24 (no_ff)"**. If FFMPEG shall be used to generate the movie, you have to set the film speed to 24 or 25. As the video then will be generated with 24 (or 25) fps and therefore will be too fast, the correct video speed must be applied via a video editor (and most video editors are able to do that - factor is 0.72 for Super 8). VirtualDub can directly work with 18 fps but not with 16 2/3 fps and VirtualDub can adjust the film speed via the Video Menu in VirtualDub.
The following image shows the film types defined in **CineToVidPro**:
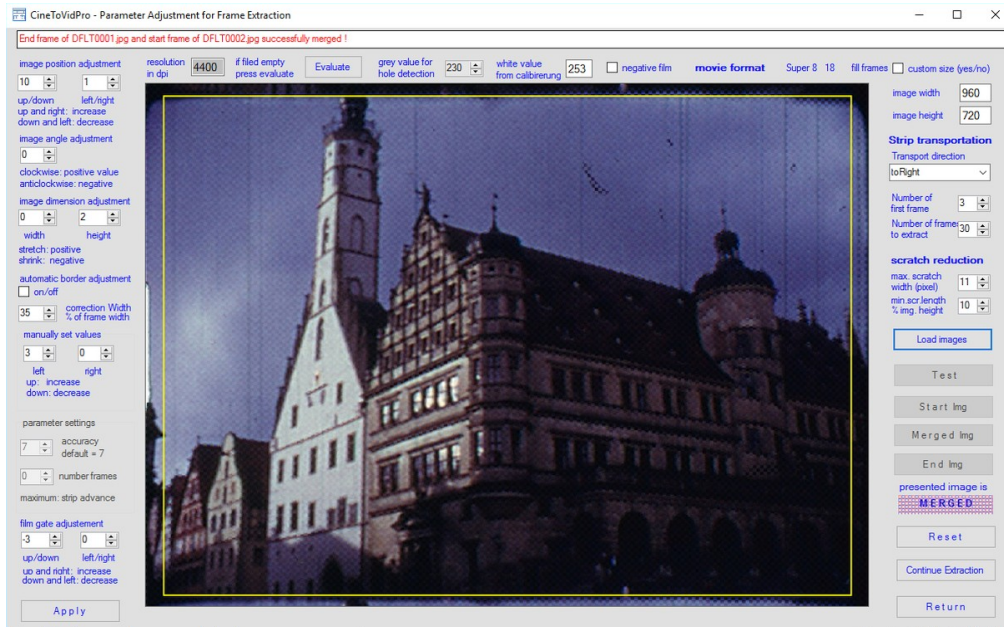

The frame dimensions (in millimeter) for the various film types are defined in **CineToVidPro** as follows:

Defined Film Types

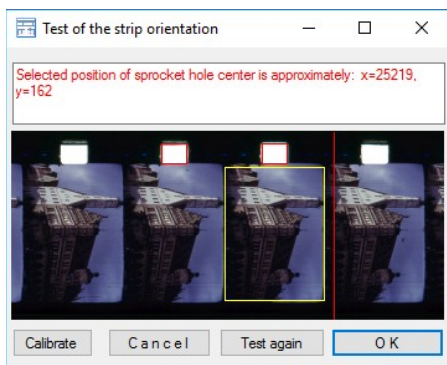| Typ Name	frame width mm	frame height mm	sprocket hole width mm	sprocket hole height mm	frame advance mm
Regular 16	10.3	7.6	1.27	1.83	7.62
Super 16	12.40	7.55	1.27	1.83	7.62
Super 16 ext.	13.30	7.55	1.27	1.83	7.62
Ultra 16	12.40	6.23	1.27	1.83	7.62
CinemaScope	14.40	6.10	1.27	1.83	7.62
All Gate	15.70	7.60	1.27	1.83	7.62
Regular 8	4.60	3.45	1.31	1.86	3.81
Super 8	5.69	4.22	1.17	0.94	4.23
Super 8 max	6.50	4.22	1.17	0.94	4.23
Pathé 9.5 mm	8.600	6.400	2.460	1.032	7.461

The Parameter Adjustment Dialog

When the cine film strips are available, parameters for the extraction of the frames must be initially set or verified if an adjustment is necessary.

In the main dialog via menu item *"Functions -> Define/Adjust Extraction Parameters"* or via button *"Adjustment Dialog"* the Parameter Adjustment Dialog is invoked which allows the definition of the adjustment parameters.

Before the Adjustment Dialog opens, the "Test of strip orientation" dialog is opened to allow the verification of the strip orientation.

In this dialog the strip must appear with the sprocket holes on top and the sky at the right. If this is not true, you have to change the strip orientation in the main dialog.

Then the two red boxes must be moved above the sprocketholes left of the red vertical line. The yellow rectangle shows the position of the frame. If the yellow box cannot be matched with a frame either the strip orientation or the film type is not correct. This must be corrected in the main dialog.

After pressing the OK button the **"Test of the strip orientation"** dialog closes and the **"Adjustment Dialog"** is opened. The images are loaded and a merged image composed from the last image of the preceeding strip and the image before the first frame of the following strip is presented in the Adjustment Dialog. That takes some time, depending on the strength of the used computer.

As a frame type, start strip, and an end strip must already have been defined in the main window the strip resolution is evaluated and the frame dimensions are calculated and presented. If no or a wrong strip resolution has been set so far, you can press button **Evaluate** to retrieve the resolution of the start strip. By default the image dimensions (derived from the film type) are defined in such a way, that the standard image aspect ratio of 4:3 is applied. In addition (required for the dust removal filter of AviSynth) a multiple of 8 of each side is forced.

You also can define a custom image size if you check the **custom size** checkmark which then allows the modification of the field content of **image width** and **image height**. The values are adjusted to a multiple of 8 to make them acceptable for the video codecs. If you want to use the default image size dependent on the strip resolution, then uncheck the **custom size** checkmark which restores the resolution dependent standard values for image width and height.

In both cases press the **Load images** button to reload the images in the desired dimension.

Whether images shall be sharpened during extraction is determined by the settings in the **options** menu *(see under options)*.

Threshold settings for dark / bright values

If frames have to be extracte from a film which is a copy from a master film, then the surrounding of the sprocket holes of such a film normally appear rather bright. This makes the recognition of the sprocket holes pretty difficult. In this case the threshold for bright must be high. A value around **"250"** is very likely needed.

Is the surrounding of the sprocket holes (using standard reversal film as normally used by amateurs) reasonably dark, then a bright value of **200 to 235** is normally sufficient. A low value guarantees higher tolerance with respect to dust in sprocket holes than a higher value. The dialog shows two values: **grey value used for hole detection** is the value that is used for sprockethole recognition, **white value from calibration** is the value, which is found via the calibration button in dialog "Test the strip orientation". This value can be used to fine-adjust the "grey value".

If negative films are scanned and converted to positive by the scanner twain driver, the sprocket holes appear deep black. In this case the colour values must be close to black (0 to about 20) and the checkbox designated **"negative film"** must be checked. The better choice is in this case to convert the strips already during the scan process.

Projection scratch reduction

The scratch reduction is a function, which reduces scratches caused in a film during projection. Two parameters are important to get an effective reduction:

- ◦ **Max. scratch width**
  Only vertical scratches with a width less than this value are handeled. 10 or 11 is a good value for strips scanned with 4400 dpi or higher. If this value is set too high, then other vertical structures in the image may be negatively affected or may dissapear!
- ◦ **Min. scratch length**
  Only vertical scratches with a length greater than this value are treated a scratches. This value is important, if your image shows many vertical structures - e.g. window crosses in images with buildings. So set the value high enough that your small vertical structures in the image are protected from beeing wiped out.
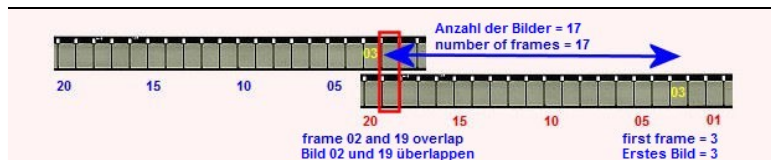
Strip Transportation

The strip transportation parameters are primarily set in the main dialog and are here only presented mainly for verification.

In the "transportation section" you must verify the **number of frames** (field "Strip advance" - *see also image below*) that have to be extracted from each strip. In addition the **nummer of the first frame** has to be checked, from which (counted from the right - *see also image below*) the extracion shall start. This frame will be included. Strip advance plus number of frist frame must be less than the number of fully visible sprocket holes in a scanned strip. The number of the first frame should be not less than 2 to guarantee overlapping of strips. This eases to find the best parameters for a smooth transition from strip to strip.
If the **number of the first frame to be used is set to 1** (that makes sense, if only very short strips can be scanned with the scanner available), then a comparision of 100% identical frames is not possible, because the frame preceeding the first frame in the second strip is not there. The comparision must be done with the first frame of the second strip. This is possible, but if there are movements in the film, then there probably will be a certain number of areas which cannot be matched perfectly (due to the movements in the film).
As there are always tiny differences in a strip between the left and the right side, it is good, when the strips overlap, in order to get a smooth transition in the film between strips borders. Using the parameters for the positioning adjustment *(see below)* you can evaluate the best values of these parameters for a smooth transition.

Scanning the strips in the flatbed scanner may be done in different ways. You can pull the film through the scanner from left to right or from right to left. You also can scan the strips with emulsion up (emulsion towards the scanner lid) or emulsion down (emulsion towards the scanner glass). Depending on how the strips have been scanned, you have to select the film orientation. It must be guaranteed, that the strips appear in CineToVidPro with the sprocketholes at the top *(as in the image below)* and side wise correct *(not mirrored or flipped - increasing image numbers from right to left - sky in the image at the right, ground at the left)*. Available are the values "**to Left**", "**to Left, mirrored**", "**to Right**" , and "**to Right, mirrored**" in order to position the strip correctly before frame extraction.
There is a rule of thumb: look at a strip with a image editor (e.g. IrfanView). The appearance of this image determines the setting. If the first frame to be used is left, use "toLeft", if the first image is right, use "toRight". If the strip appears mirrored, use a mirrored setting. Important is the film transportation direction (which image follows the currently projected frame), not the direction in which you scanned the strip.

Strip join and frame adjustment

Using the fields in the dialog's left border column, you can align the frames coming from different strips at strip borders. As there are always small inaccuracies when scanning strips, you need to eliminate an offset of frames or a twist of image axes at strip borders. In addition you can set the gate position, and you can correct a kind of "pseudo pin-cushion distortion" resulting from film curling, because it is very difficult to keep the film exactly flat (especially if you have long strips) in the film guide during scanning.
For a border correction (pseudo pin-cushion correction) the vertical columns of immages are slightly moved up or down. The movement is dependent on the distance of the column from the image border. The biggest movement is at the image border. It gets smaller (following a parabolic function) towards the center of the image. The width of the area, in which the correction is applied, can be set as a percentage of the image width - equally for the left and right image side.
Annotation: As said before, you can correct the pseudo pin-cushion distortion with CineToVidPro reasonably good, and the parameters to do that can be set manually (same value for all strips), but they also can be evaluated automatically. This works reasonably well, if the images are well structured at the image borders, but with poorly structured and monochromatic images borders the parameter values are also pretty uncertain. The accuracy of the automatic border correction can be set as parameter. Minimal value is 3, a reasonable value is 7 but even a value of 12 sometimes delivers useable corrections.
But to avoid image border jumping you should not trust too much in the correction algorithm (with straight lines there are ugly side effects, which can be well seen in the movie). It is always better to invest in a really **precisely crafted film guide** to avoid or at least to minimze pseudo pin-cushion distortions.

If you recognize, that the values are "drifting away" during frame extraction, you can set the various parameters for the various input fields even when extraction is ongoing. This is to allow permanent adjustment, because there may be always slight diffrences that have been built up during the scannig process. The changed values will be used as soon as a new strip is activated for extraction.

The **"Reset"** button resets the dialog fields to their default values.
The **"Continue extraction"** button starts the extraction of images from the actual start strip. It keeps the adjustment dialog open.
The **"Return"** button closes the dialog and returns to the main dialog. In this case the extraction of the images has to be started in the CineToVidPro main dialog.

It is not easy to find the best parameters for a smooth transition from strip to strip.

The evaluation of the best adjustment parameters is done by trying to match as good as possible the last image to be extracted from a strip with the image one position before the first image (frame 0) to be extracted from the following strip. In the drawing in section "strip tranportation" this would be frame 19 and frame 2. This frames should be identically, because they are the same image in the original film. But due to the always existing manufacturing tolerances in flatbed scanners and due to the always slightly different film orientation in the scanner these images are not 100% identical and therefore they do not match 100%. The task is now to move, rotate, and resize frame 0 in such a way, that it fits best as possible with the corresponding frame in the preceeding strip. This will not be completely successful, but the deviations can be minimized.

You can move **up** and **down** and **left** and **right** frame 0 (also called **start image**) and you can adjust the frame **width** and **height**. You can also rotate the image **clockwise** and **counter clockwise** to match it as good as possible to the last frame of the preceeding strip (also called **end image**). If a pseudo pin-cushion distortion exists, you can move up and down the image borders. You can specify the maximum shift at the image borders left an right. Maximum shift is limited to about 1/100 of the image height. Larger corrections must be corrected by rotating the image.

The adjustments are performed after button **"Apply"** has been pressed and the new merging result is shown.
This procedure must very likely be repeated several times until a sufficiently well result has been achieved.

You can change several parameters simultaneously, but the effects of combined actions are not always predictable very well. Therefore it is recommended to manipiulate only one parameter at a time.

The result of an adjustment not only can be verified using the merged image. With the buttons at the right border of the window you can switch between start image and end image. The field below the buttons shows, which image is currently presented.

And additionally you can verify the result by switching between the last image of the preceeding strip and the first image of the active strip. This is done be pressing the **"Test"** button repeatedly. This sequence of images appears in the final film.

If you think you have achieved the optimum, you still have to adjust the **film gate** with the fields at the left border of the window. The yellow frame shows, what will be extracted as film frame.

If you got totally lost you can press the **Return** button e.g. to select a different start strip. In this case the currently active values will be used - or you can reset the parameter values by pressing the **Reset** button to get the original start situation.

If the adjustments are made, you have to press button **"Continue extraction"** or button **"Return"**. This saves the evaluated values for the following frame extraction.

Generate Movie Frames

After the final extraction parameters are set, you can start with the extraction of the cine film frames.

The generation process is started in the main dialog either via button **"Generate Frames"** or via the menu item *"Functions -> Generate Frames" in the CineToVidPro main window*. Both selections have the same result.

If you have many strips to process and your computer is powerful enough, you can select, how many threads (field *number of extraction threads* in the main window of CineToVidPro) should be started to do the extraction simultaneously. Standard is one independent thread. Up to 3 threads can be exploited, but only, if no automatic border adjustment is specified. Using more than one thread can reduce the elapsed time needed to do the requested work. But take care: if your computer's ressources (multicore processor, main memory) are not sufficient, multiple thread invocation may result in an error message telling you, that you ran out of ressources.

When the function has been triggered, first the "Initial Sprocket Hole Selection Dialog" pops up *(as in the **Adjustment Dialog** above already described)*. After the initial sprocket hole position has been confirmed (**Apply** button in the *initial sprockethole position* dialog), the extraction of the cine film frames starts.

The progress is shown (for each active thread) in a line for the currently processed strip and the currently processed frame.

In the image pane always the image of the currently active thread is presented. That means, the images are not always presented in the correct sequence. But in the target folder they are stored correctly.
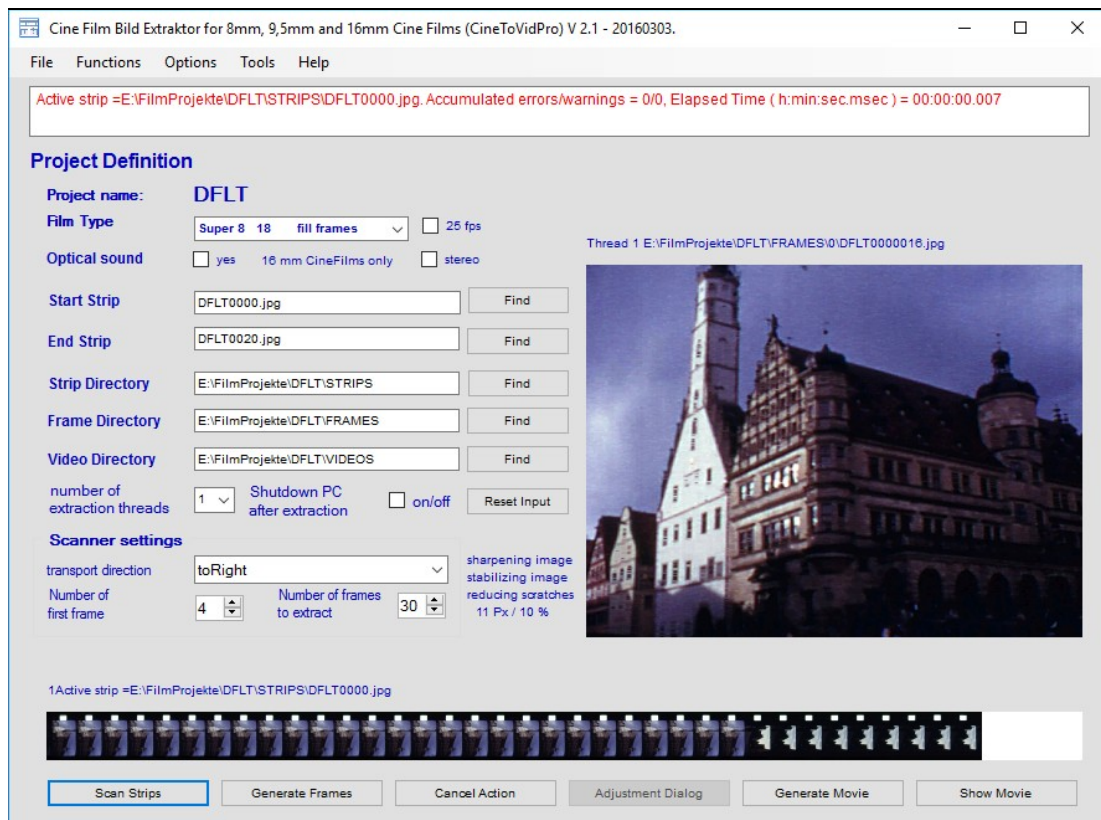
In addition in the message line at the top of the window a progress message with a time stamp is also shown.

After all strips have been processed, a completion message is presented in the message line showing the number of errors occured and the time needed to do the job.

An extraction process can be stopped before it ends normally (that is: after having processed all provided strips). To cancel a running exctraction process hit button **"Cancel Action"**. The currently active strips will be processed to the end, and then the task(s) are terminated. Via button "Adjustment Dialog" you can resume the extraction after the adjustment parameters probably have been re-adjusted.

The frames are always extracted stripwise. After the frames of a strip have been extraced the optical sound - if available - will be digitized. This also is done stripwise. For each strip a file with raw PCM data is generated and stored in the VIDEO directory. After all sound files have been generated, the final step is to join these files to a single WAV PCM raw data file. This step is required to guarantee the correct sequence of the sound elements if more than one thread is exploited to generate the frames. The sound element files persist, but can be discarded if they use too much space on the hard disk drive.

The extraction of the frames may take a while, especially when the sharpening function has been activated. Therefore it is possible to specify, that the computer shall be shutdown after the extraction has been completed. This is done by selecting the checkmark **"Shutdown PC after extraction"** (below the directory specification fields).
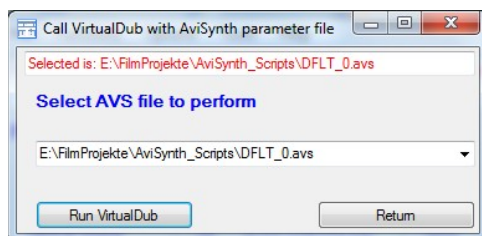
Generate Movie

CineToVidPro normally exploits **FFmpeg** to generate the movies.
But more functions offers **VirtualDub** in combination with **AviSynth** to generate the videos.

Generierung with VirtualDub

The generation process with **VirtualDub** and **AviSynth** is a process performed in a session independent from CineToVidPro. If VirtualDub shall be started via the "Generate Movie" button, then VirtualDub and AviSynth must be activated via the **Options** menu. The *"Generate Movie"* function creates - using the **"00_AvsSkeleton.txt"** or **"01_AvsNoSkeleton.txt"** s keleton file *(stored in the "AviSynth_Scripts" folder of the base directory)* - a project specific ".avs" file. The name of this file is composed from the 4 character project identification followed by and underscore and then followed by the 1 character subfolder name (example: DFLT_0.avs). This file is also stored in the base directory. If more than one subdirectory exists, the .avs files for all subdirectories is generated in one step.

In the following dialog all existing .avs files are presented in a drop down list and you have to select the desired file from this list by highlighting the entry. The selected file will be presented as control file to VirtualDub when you press button **"Run VirtuaDub"**.

AviSynth functions as a frame server for VirtualDub, that means, VirtualDub is not aware of the fact, that not a video file but a sequence of images is presented to it as input.

Hint 1: *If the .avi file cannot be opened correctly, the frames most likely start not with frame number zero.*

VirtualDub can work with a large number of different filters. To generate the movie with VirtualDub is therefor a good choice, if more than one correction (e.g stabilization and cleaning) has to be applied to the movie in a single run.
There are 2 skeleton files provided by CineToVidPro. Which skeleton file is used is determined by the selection in the options menu.
The file **"01_AvsNoSkeleton.txt"** does not provide filters. The filters must be seleted in the VirtualDub window (VirtualDub -> Video -> Filters).
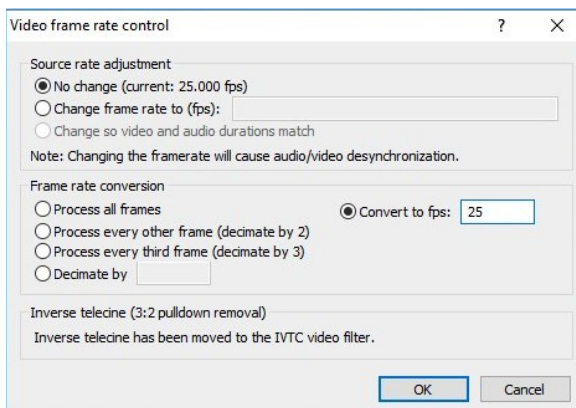
"00_AvsSkeleton.txt" provides control statements for movie stabilization, for image sharpening and image cleaning.

If several filters are used simultaneously, several intermediate results have to be generated. Therefore the generation process can be very slow. Processing of only 2 to 3 frames/second or even less may happen very likely.
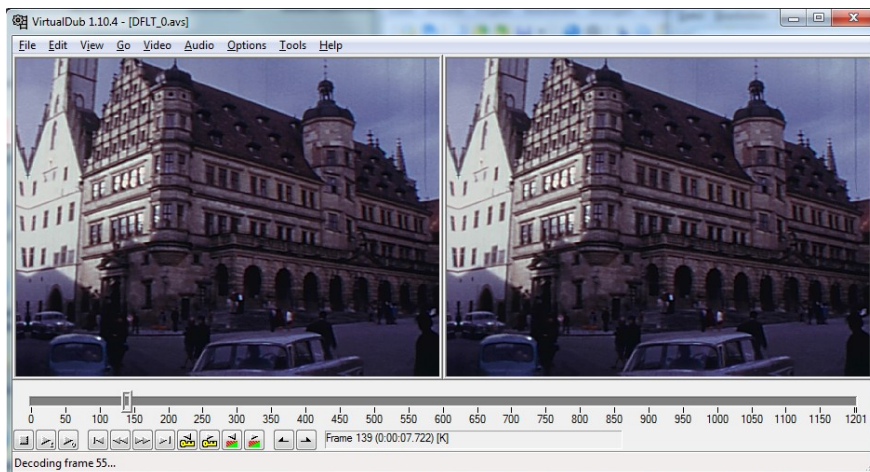
Hint 2: *The dust removal function of AviSynth* works only propperly, if no duplicate frames are contained in the stream of presented images. The frame extraction therefore has to be performed with "no fill frames".

To have the movie projected later on with the correct speed for Super 8 and Single 8 films which had been recorded with 18 frames/second a speed correction has to be applied. This can be done via the Video menu of VirtualDub which allows to specify a target frame rate for projection (VirtualDub -> Video -> Frame rate) . The factor for the conversion of 18 frames/sec to 25 frames/sec is 0.72.

Formula: for Super8/Single8 films with 18 frames/second: film length generated by VirtualDub divided by 0.72 results in the correct/original film length (example: 60/sec/0.72 = 83.3 sec).

Hint 3: *The AviSynth dust removal function* is not very good with large dirt spots. It is therefore good practice to use the CineToVidPro dust removal function (see below) to "pre-clean" the images. During this step you can also correct splice positions and other distortions in the film.

Generation with FFmpeg

The movie generation process with **FFmpeg** is triggered via the CineToVidPro main window menu item *"Functions -> Generate Movie"* or button **"Generate Movie"**. Via menu **Options** FFmpeg must be selected as movie generation tool.
FFmpeg is a command line tool. It is therefore executed in a command line window.

The parameters needed by FFmpeg are mostly provided by CineToVidPro, but some must be provided manually via the following dialog:

Especially provided must be the subdirectory from which the frames should be taken. **Select an entry in the SubDir combo box**.
Caution: the numeric part of the frame id's in the subdirectory should start with **000000**. If this is not the case, there might be problems when FFmpeg tries to generate the movie. You may have to renumber the frames.
Also manually provided must be the **movie name**. Any name accepted by Windows as a file name is valid.
If you want to have your movie generated with a specific aspect ratio (ratio between frame width and frame height) you can select the desired ratio from the **Aspect ratio** combo box. Default value is **'frame'**, that means the ratio is used, that the provided frames have.
The **frame rate** *(if 'preset' is specified)* is taken from the checkbox setting in the CineToVidPro main window just behind the film type combo box. If checked, **25 fps** is used, if not checked **24 fps** is used.

You can modify the other settings if you think other values will better fit your needs. The explanation of the values is given in the FFmpeg documentation.
CineToVidPro provides the essential set of parameters that guarantee movie generation. But there are so many more parameters. They cannot be provided all in this dialog, therefore there is an **"individual arguments"** field, you can use to provide additional parameters for your special set of parameters.

There is one more parameter you should keep in mind: **"Overwrite output file"**. If you do several tests, checking this box will prevent you from beeing continuously questioned whether you want to overwrite an already existing file or not.
If this box is not checked, you will be reminded about it in the message line.

If all values are set according to your desires, you can check the generated command in the **"resulting command arguments"** field when you press the **"Show Cmd"** button.
To run the command, press the **"Run"** button. If you want to cancel the dialog press the **"Return"** button.
As FFmpeg does not accept gaps in the numbering system of the image input files, you can test with button "Test sequence" if the input directory complies to the FFmpeg requirements.
After FFmpeg has completed the movie generation and the parameter **-report** is been specified, than the messages generated by FFmpeg can be viewed via button **"Show Report"**. To be able to do this of course an appropriate text editior must be defined (see "Functions -> define required commands").
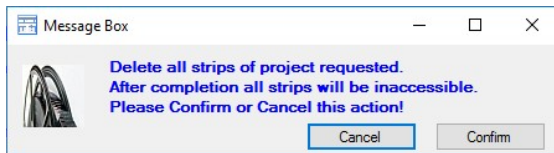
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Show Movie

When you have successfully created your movie you can view it via button **"Show Movie"** or via *"Functions -> Show Movie"* (if you have already defined a media player via dialog Define required commands). The button opens the system's file selection dialog and shows all files with the **.mpg** and **".avi"** file extension in the projects VIDEO directory. You can select one and when returning from the selection dialog, the selected video will be presented.

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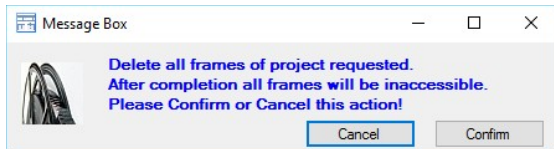
Delete all scanned Strips of Project

Via menu item *"Functions -> Delete all scanned Strips of project"* you can remove all strips from the STRIPS directory. Before the deletion is performed, a confirmation message is presented, in which the deletion has to be confirmed.

Delete all extracted Frames of Project

Via menu item *"Functions -> Delete all extracted frames of project"* you can remove all frames from the FRAMES directory and it's subdirectories. Before the deletion is performed, a confirmation message is presented, in which the deletion has to be confirmed.

Extended logging on/off

With this entry you can request extended logging of the activities performed during frame extraction.
A previous setting of the logging request is not kept. Logging must be set new for each session.

Clear Logfile.

All existing entries in the log file are erased.

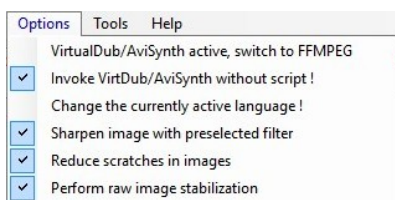## Clear Errorfile.

All existing entries in the error file are erased.

CineToVidPro - Options

The Options Menu:

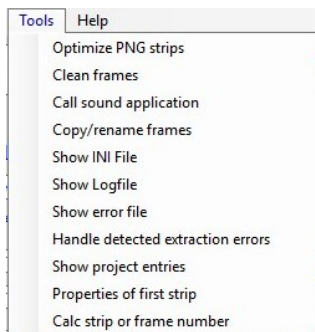With the entries in the **Options** menu you can

- ◦ specify, whether the video generation shall be done with VirtualDub and AviSynth or with FFMPEG.
    - ▪ VirtualDub/AviSynth active, switch to FFmpeg
      or
    - ▪ FFmpeg active, switch now to VirtualDub/AviSynth
- ◦ Start VirtualDub without AviSynth Script (on/off)
  You can start VirtualDub without the generated AviSynth script (skeleton 01_AvsNoScript.txt), e.g. if you want to manually clean your frames with the native image cleaner or you want to use the Deshaker function of VirtualDub - which tremendously speeds up the video generation with VirtualDub.
- ◦ select the desired language. Currently (March 2016) only English and German is implemented.
- ◦ determin, whether images shall be sharpened with the embeded CineToVidPro sharpening function during the extraction process. (on/off)
  Sharpening needs, that you first select and activate a sharpening matrix (filter) via the sharpening tool - see sharpening tool in the tools menu. The matrix values are saved in the project's INI file. If no sharpening filter is selected, a default filter (providing strong sharpening) is used.
  Please be also aware, that sharpening is a very computing intensive process which slows down the extraction process significantly.
  If you use VirtualDub and AviSynth, you can do the image sharpening also via filters provided by these programms. But this is even slower.
- ◦ Projection scratches reduction (on/off)
  This function reduces vertical scratches in the film during frame extraction.
  The parameters for this function (the minimal scratch hight and the maximal scratch width) have to be set in the adjustemnt dialog.
  As it is difficult to differenciate between real scratches and vertical structures in an image scratches may sometimes not be removed completely in a frame.

◦ Perform raw stabilization (on/off)
  Activates a raw stabilization of the frames during extraction.
  If this function is used, the manual image cleaning with the native image cleaner is more effective and the final movie stabilisation can be done with your video editor - if it offers a stabilization function.
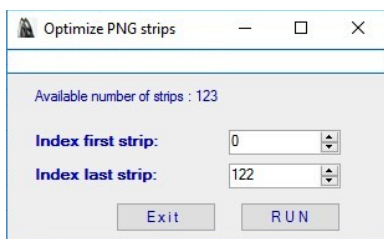
CineToVidPro - Tools

The Tools Menu:

With the entries in the **Tools** menu you can

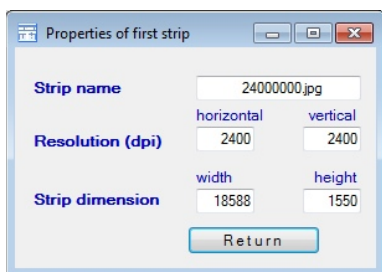◦ optimize not optimal stored PNG strips

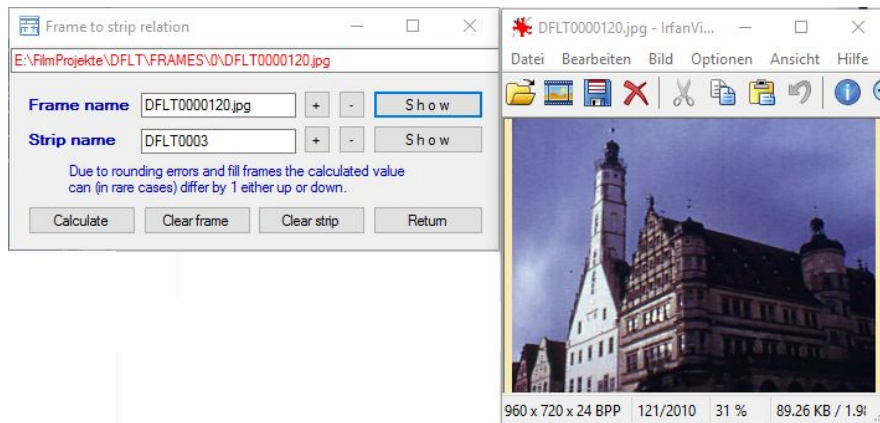◦ clean extracted frames from fluff and dirt.
  (See below under Image Cleaner)

or (if you have already have defined a text editor via dialog Define required commands)

◦ show the entries in the project's log file
◦ show the entries in the project's INI file
◦ show the project entries
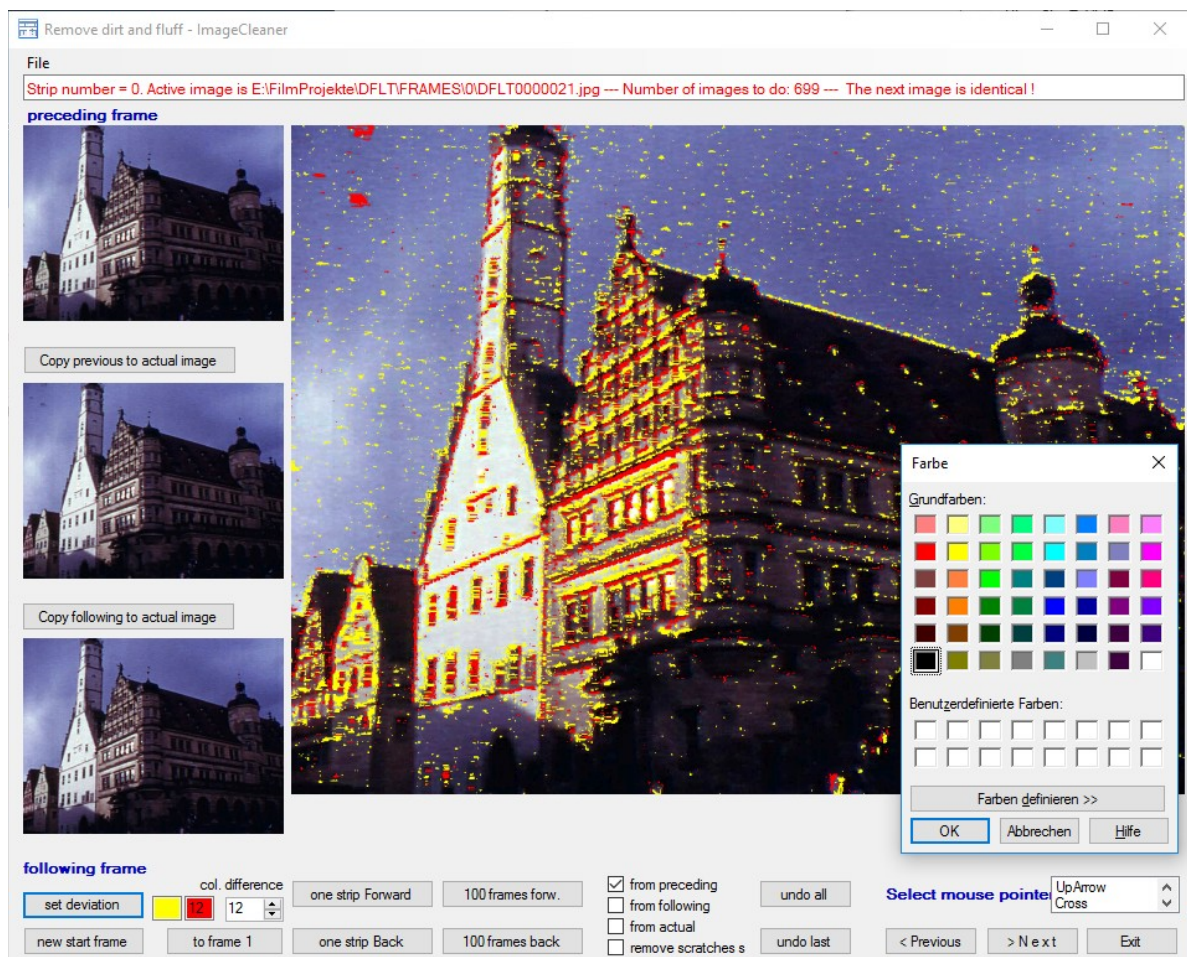◦ show the image properties of the start strip

and

◦ evaluate the strip name from a given frame name and vice versa.
  The strip or frame file can be shown with the defined image viewer, if the file exist.
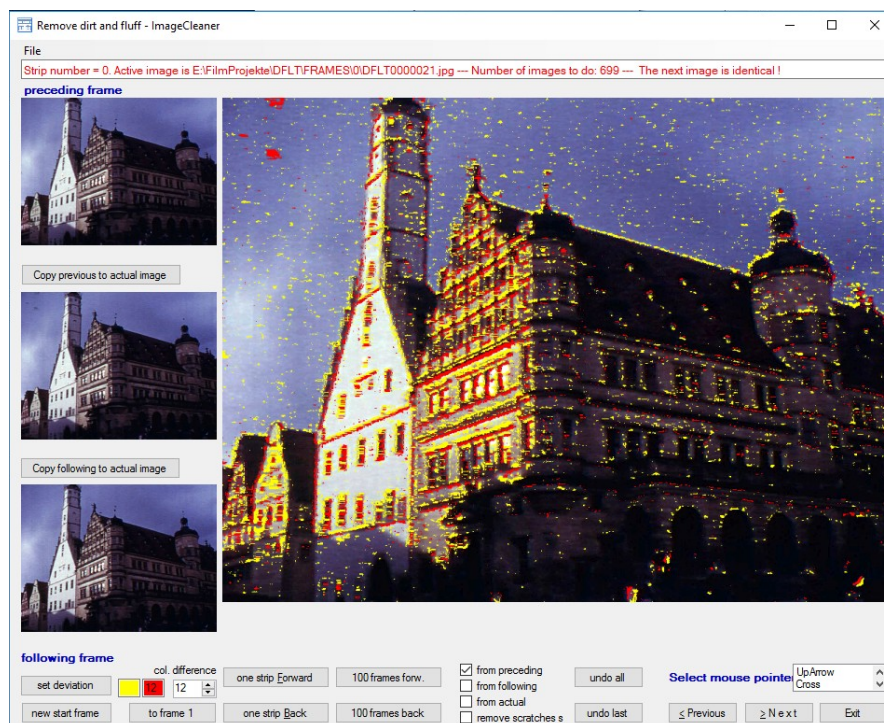
Image Cleaner

When scanning film strips you always scan also tiny (invisible) dust and fluff particles which disturb later during film persentation very much because they are blown up tremedously. To eliminate at least the most disturbing ones CineToVidPro provides the **"Image Cleaner"** dialog:

With the "image cleaner" function you can remove dust and fluff from the scanned and extracted video frames. But this process cannot be fully automated, because a computer program is not able to distinguish between real dirt and a valid picture element e.g a passing bird in the sky. But the function eases significantly the recognition of potential dirt spots and scratches by highlighting the potentially dirty areas with an eye-catcher colour. Since Version 1.5 the eye-catcher colour to be used to highlight the dirt can be selected via the button **"set deviation color"** triggering the sytem colour selection dialogue.

The function presents the images of a video in increasing sequence in 4 panes. The upper left small pane shows the frame **preceeding** the actually handeled frame - this frame is normally already cleaned. The small pane below shows the **actually handeled** frame and below that the **following** frame is shown.

The big pane shows the analysis image. It presents via a strong color indication (e.g. light yellow and red) all areas of an image in which the color of the same image element (pixel) deviates more than a defined value from the color of the preceeding and following image. For the shown example: light yellow indicates a brighter pixel, red indicates a darker pixel.
With this color indicator you can also determine, whether only "too dark" (in the example the red marked) pixels shall be corrected or if both - too dark and too bright - pixels should be adjusted. A double mouse click into the darker analysis color field determines the correction type. If in the brighter color field "OK" is shown, than only too dark pixels are adjusted, the brighter ones are treated as OK.

If a color indicator is set, it is assumed that an image distortion exists. If it is really a distortion or if it is the already mentioned passing bird, only the human observer can decide. The sensitivity of the analysis is determined by the value in field **"color difference"** (lower left corner of the upper small pane). The bigger the value, the lower the sensitivity of the color diference analysis and the smaller the amount of marked pixels apppear in the analysis pane. What the optimal value is, the observer has to decide according to the images to be cleaned.

How to perform image cleaning

Image cleaning is controlled by mouse operations. A three button mouse (left middle and right button availabel) is desireable. The process is like this:

1. The mouse pointer for the image segment selection is always set to "UpArrow". If you want to change the mouse pointer form (e. g. to a cross hair) for the current session, you can do this using the selection list in the right lower corner of the window. For the active session the selected mouse pointer form is then kept until it is changed again.
2. Move the mouse pointer to the left upper position of a rectangle at which cleaning should start.
3. Drag with **left** mouse button pressed the mouse **always** from the upper left corner to the lower right corner of the rectangle at which cleaning should end. The described rectangle appears with a white borderline.
4. Release the **left** mouse button. The marked area remains visible. To check the selected area, the rectangle is also shown in the small pane at the right of the analysis pane. If the area is badly selected, start again at 1.
5. If the selected area is OK, **click** the **right** mouse button. The eye-catcher color is replaced with the correction color and the cleaning result is presented. Standard source for the correction color is the preceeding frame - because this frame most likely is already cleaned.
   With the central buttton (between buttons "new start frame" and "undo all") you can select a different color source for the color restauration. Possible are (see also below) : from preceding, from following, from actual, and remove scratches. This selection holds until a new selection is made. But if you want (just for one cleaning action) to use "remove scratches" you can klick onto key "S". The the next replacement action is done with "remove scratches" and after that it is switched back to the original source.
6. If all corrections are done and the result is reasonably good, click at the **middle** mouse button or alternatively do a double-click on the **left** mouse button or click on the character button **'>'** (that allows to work with two hands), to advance to the next image to be cleaned.
   Hint: A click on the character button **'<'** brings up the preceeding frame.
   Annotation: If for Regular 8, Super 8 and Pathé films additional fill images have been generated, this fill images are skipped, that means these images are replaced with the currently corrected image. A message at the top of the window indicates, that a fill image follows.

The just described standard procedure can be modified with the buttons at the lower window border.
The buttons have the following meaning: (from left to right)

1. **to frame 1**: The process normally starts at that image, that has been cleaned as last image in the preceding cleaning session. If you want due to a certain reason start at the beginning again, clicking this button will show the first image of this group again.
2. **100 frames back**: To speed up positioning this button advances 100 frames towards the start of the group. If there are less than 100 frames left, the first image will be shown.
3. **100 frames forw.**: To speed up positioning this button advances 100 frames towards the end of the group. If there are less than 100 frames left, the last image will be shown.
4. **1 strip back**: To speed up positioning this button advances 1 strip towards the start of the group. This eases the correction of distortions that appear in each strip at the same position.
5. **1 strip forw.**: To speed up positioning this button advances 1 strip towards the end of the group. This eases the correction of distortions that appear in each strip at the same position.
6. **new start frame**: With this button you can set a new start frame. The cleaning process start at this frame.

7. **Color Source**: With this button you can define, from which source the correction color is taken. The text of this button changes, when you click at it. The following values are defined:
    - **"from preceding"** (Standard),
    - **"from following"** (if the preceding image e.g. due to a scene cut is not valid),
    - **"from actual"** (if preceeding frame and following frame are not good enough - use only for small rectangles. Only cyan colored pixels are replaced by the correction color)
    - **"remove scratches"** (only valid for areas with small width or small height. Scratches will be replaced by a interpolated color).
    To just perform one correction with the option "remove scratches" you can press the "S" key. After the correction it will be switched back to the previous correction source. A double click onto the right mouse button has the same effect.
8. **"undo all"** all corrections applied to the actual image are set back.
9. **"undo last"** the last applied correction to the actual image is set back.
10. **"Previous"** switch back (towards start) for one frame (preceding frame is shown again).
11. **"Next"** switch foreward (towards end) for one frame (following frame is shown). A double click onto the left mouse button has the same effect.
12. **"Exit"** Close the cleaning session and store the path to the last cleaned frame to the INI file.
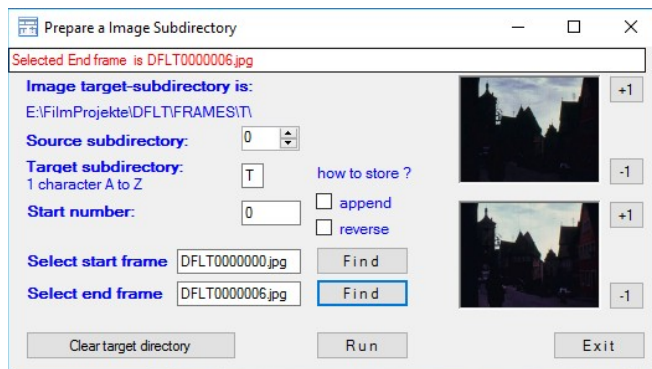
Below the upper (preceding image) and lower (following image) small panes there are additional buttons.
With this buttons you can **overwrite** the **actual image** with the **corresponding image**. This is usefull if you want e.g. replace an image that is at a splice position due to a scene cut.

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Copy / Renumber Frames

Due to the rule of FFmpeg, that an image sequence has to start with image number **000000.jpg** it might happen, that the generation of movies is not possible. To solve this problem, CineToVidPro provides the **"Prepare a Image Subdirectory"** Dialog.

This dialog allows to copy a sequence of images from a selected start image to a selected end image into a subdirectory (both images included) in the frames folder to a new subdirectory in the FRAMES directory.
This directory is named with a single letter between **"A"** and **"Z"**. Default letter is **"T"** for tentative or temporary. The numbers of the images in this subfolder always start with number 0 so that the demand of FFmpeg is fulfilled.

To start the copy operation first select the sudirectories, from which the images shall be taken or to which the frames shall be stored. You get a message, if the selected subdirectory does not exist, or the selected number is out of range
Then use the find buttons to determine the start and the end image via the system's file selection dialog. Thumbnails of the selected images are shown for verification. If the selection was not precise enough, you can use the +1 and -1 buttons to adjust the selection.

After the images have been selected, press the **"Run"** button. If the target directory is not empty, you get a message requesting that you press the **"Clear"** button to erase all content and than the **"Run"** button again to trigger the copy operation.
Copying is done in a separate thread and the **"Exit"** button is disabled as long as the copy operation is going on.

The completion of the copy operation is indicated by a message, telling the number of images copied to the "T" subfolder. The **"Exit"** button is made available again.

The subfolder (for instance **"T"**) now can be used as source for the video generation in the same manner as the numeric subfolders in the **Frames directory**.
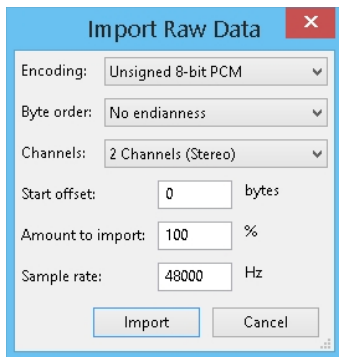
Hint: To avoid copying, it is sometimes better to copy before extracting the images the first strip(s) and give them a sequence number starting with 0. The extra frames (duplicate movie segment) can later be cut off after the movie has been generated during the post processing activities with your movie editor.
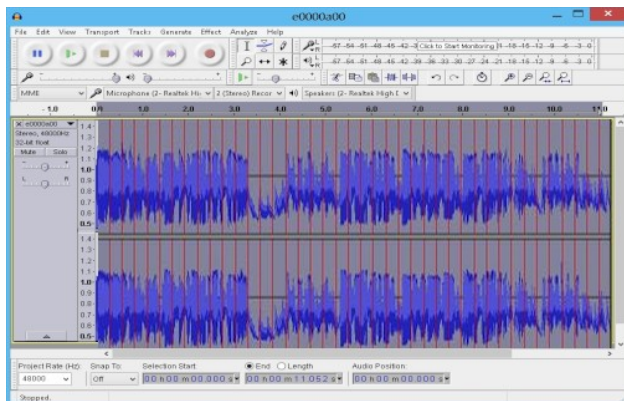
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Call sound application Audacity

With this menu item the free audio editor **Audacity** is invoked. With Audacity the raw PCM sound data generated by CineToVidPro must be converted to a specification-corresponding WAV format.
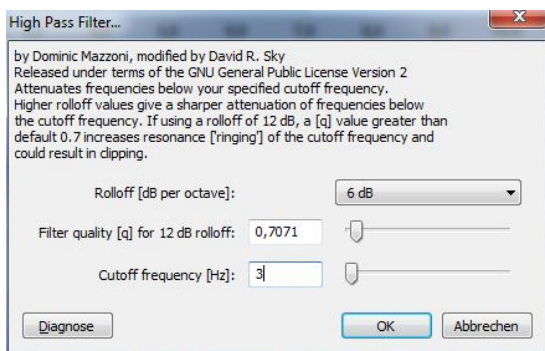
The audio editor **Audacity** can be called via the **"Tools Menu"** *if it has been specified in the "Define required Commands" dialogue before*. The generated PCM raw data file named "XXXX.raw" (XXXX = project identification) in the VIDEO folder *(the file name is displayed in the message line of CineToVidPro)* must be imported as "raw PCM data" with the following parameters *(unfortunately this can only be done manually)*:
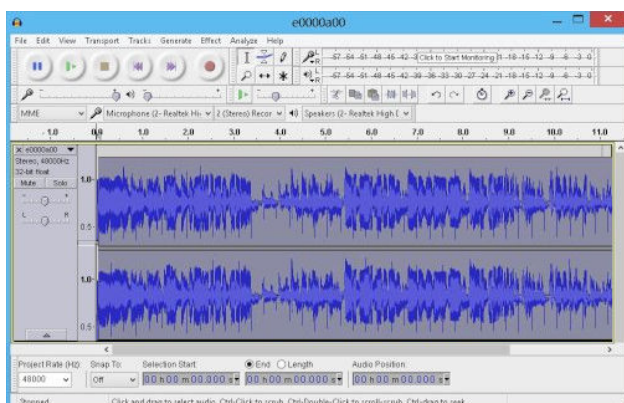
After import completion, the sound graph is presented as follows. You most likely will see a number of (red) clicks, which normally appear at strip boundaries.

To remove theese clicks, you should apply (using Audacity Effects Menu) a High Pass Filter of 3 Hz as shown in the following picture.
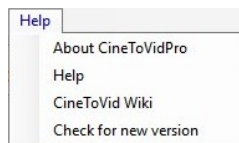

The application of the High Pass Filter generates (normally) a cleaned graph with symmetrically arranged sound tracks.

After all additional modifications (like normalization etc.) have been applied, you can store the result by exporting the file from Audacity to your target library.
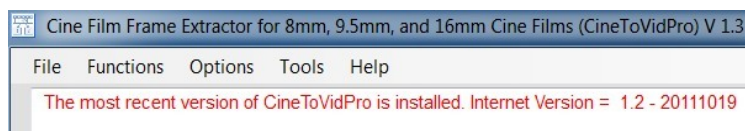

CineToVidPro - Help

The Help Menu:

With the entries in the **Help** menu you can

- show the About dialog of this product.

- show this Help

- invoke the CinToVid Wiki on the internet

  and

- Check if there is a new version available in the internet.

Last change: Marcj 06, 2017 WK