TRIAXES® 3DMASTERKIT™

USER GUIDE

Triaxes Ltd. Tomsk, Russia

Web-site: www.triaxes.com

Technical support: support@triaxes.com

1. PREFACE

1.1   System requirements

- IBM – compatible PC.

- Operations system: Windows XP/Vista/7/8 (Windows 7/8 is recommended).

- RAM: 512 Mb (preferably 2 Gb and more).

- Free disk space: 100 Mb for software installation.

When working with the large images (large data volume), space for allocating service files and images created during work with the software, will be required.

1.2   3DMasterKit activation

It is necessary to activate 3DMasterKit program in order to use it in a full mode, which would allow you to get technical support and information about updates. Until activated, the program will run in a demo mode.

To perform activation, do the following steps:

1. Run the command **Help >> Activation**

2. In the Activation dialog click Open and indicate the path to the activation file received from the software vendor.
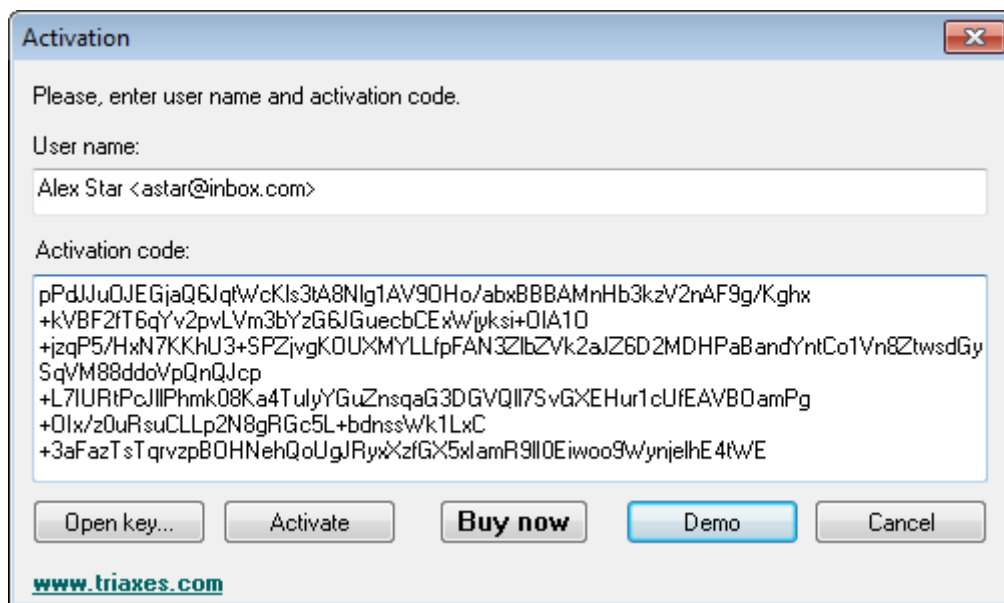
3. Press Activate to complete the process.

Fig. 1.1. **Activation** dialog

After activation is completed the **About** dialog (menu tab **Help>>About**) will display the user name.

For detailed information, please, refer to the **Triaxes Activation Guide** (after program installation   Activation.pdf   file   will   be   located   at "C:\Program Files\Triaxes\3DMasterKit\Help\").

Fig. 1.2 **About** dialog

1.3 3DMasterKit Demo version limitations

Demo version of 3DMasterKit has the following limitations:

- Generated images have a semi-transparent stamp: «Triaxes 3DMasterKit Demo www.triaxes.com».

- In accordance with the 3DMasterKit license agreement, Demo version of the program may be used without timelimitations.

- It is prohibited to sell 3DMasterKit demo-version, to distribute it as a part of any other software product without written consent of copyright holders.

1.4 Technical support

For technical support, please, contact the supplier from whom you purchased the 3DMasterKit package. Besides, you can ask your questions by sending an e-mail message to support@triaxes.com. When addressing your technical request, please, specify your activation user name, electronic key serial number, and program edition.

The web-site http://www.triaxes.com contains news on the Triaxes 3DMasterKit software, as well as updates which you can download. It also provides useful articles on the theory of stereo-lenticular technology and 3DMasterKit operation, information on distributors, as well as answers to frequently asked questions (FAQs).

1.5 Subscription to 3DMasterKit program updates

Free updates of all 3DMasterKit products are available during the year from the moment of purchasing 3DMasterKit. After the end of the period, to download updates you need to purchase the subscription for updates or upgrade the program edition, which would automatically prolong subscription for one more year.

If you wish to purchase the subscription for updates, buy a new product from 3DMasterKit package, or upgrade the program edition, please, contact sales department:

e-mail: info@triaxes.com

post address: 634055, PB 2312, Tomsk-55, Russia

Tel: +7 (3822) 701429

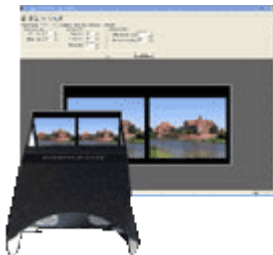When submitting your request, please indicate the following:

1. Your name.
2. Your e-mail.
3. Your phone number.
4. The distributor you purchased 3DmasterKit software package from.
5. The date of purchasing 3DMasterKit software package or the previous update.

The information about new versions is published on the web-site www.triaxes.com and sent to Triaxes news subscribers.

2. USE OF 3DMASTERKIT

2.1   3DMasterKit Purpose

Triaxes 3DMasterKit is used to generate (encode) stereo images that can be viewed by a number of various viewing methods. 3DMasterKit creates three-dimensional images of the following types:

1. Encoded images for viewing via lenticular lens. 3D images produced with this method can be viewed without additional devices. The program allows you to produce lenticular images with various dynamic effects: flip, motion, morphing, zoom. Besides, you can use the program to create sequence of frames out of a single source image and a multilayer template (see Section 2.11).	
2. Anaglyph images (monochrome, quasi-colored, and colored) for viewing via two-color glasses.	
3. Stereo pairs for direct viewing using the parallel and cross-eyed methods without additional devices – the .jps format for viewing in the Internet.	
4. Stereocards for viewing through a stereoscope.	
5. Interlaced 3D images for viewing through LCD shutter glasses.	

The general procedure of creating stereo images of any type includes several steps:

- opening sequence of frames;
- adjusting their relative positions and cropping;
- specifying parameters and generating a stereo image;
- saving or printing the image.

The program also allows you to apply various additional design elements (logos, frames, labels, etc.) to final encoded images.

2.2   3DMasterKit Editions

Triaxes 3DMasterKit is available in the following editions:

Edition	Features

3DMasterKit Start	Study and start to work. The edition is designed for amateurs and photographers. Flip of two frames. Stereo of two frames. Stereo image of multiframe sequence with templates.
	
	Format of generated lenticular images:
	      size up to 10x15 cm (4x6 inches),
	      maximum resolution up to 720 ppi (pixel per inch).

3DMasterKit Home	The edition is designed for amateurs and professional photographers. The program allows producing all types of lenticular images including those with various dynamic effects (flip, morphing, zoom and animation), multiview stereo from a sequence of frames, as well as multilayer stereo from templates.
	
	Format of generated lenticular images:
	      size up to 18x24 cm (7x9 inches),
	      maximum resolution up to 720 ppi.

3DMasterKit Photo A4	This edition is for photo and digital printing shops. Package has a broad spectrum of application: creating stereo lenticular portraits, photo pieces for interior decoration.
	
	Format of generated lenticular images:
	      size up to 21x30 cm (8x12 inches),
	      maximum resolution up to 720 ppi.

3DMasterKit Photo A3+	This edition is also for photo and digital printing shops. Package has a broad spectrum of application: creating stereo lenticular portraits, photo pieces for interior decoration.
	
	Format of generated lenticular images:
	      size up to 35x50 cm (14x20 inches),
	      maximum resolution up to 720 ppi.

3DMasterKit Photo 120	This edition is for advertising agencies and professional photographers.
	
	Format of generated lenticular images:
	      size up to 80x120 cm (33x50 inches),
	      maximum resolution up to 1440 ppi.

3DMasterKit Pro	The pro-level edition for professional application in printing trade, advertising, and photography. The size of generated lenticular images is unlimited, maximum resolution up to 7200 ppi, CMYK support.

2.3   3DMasterKit Main Window

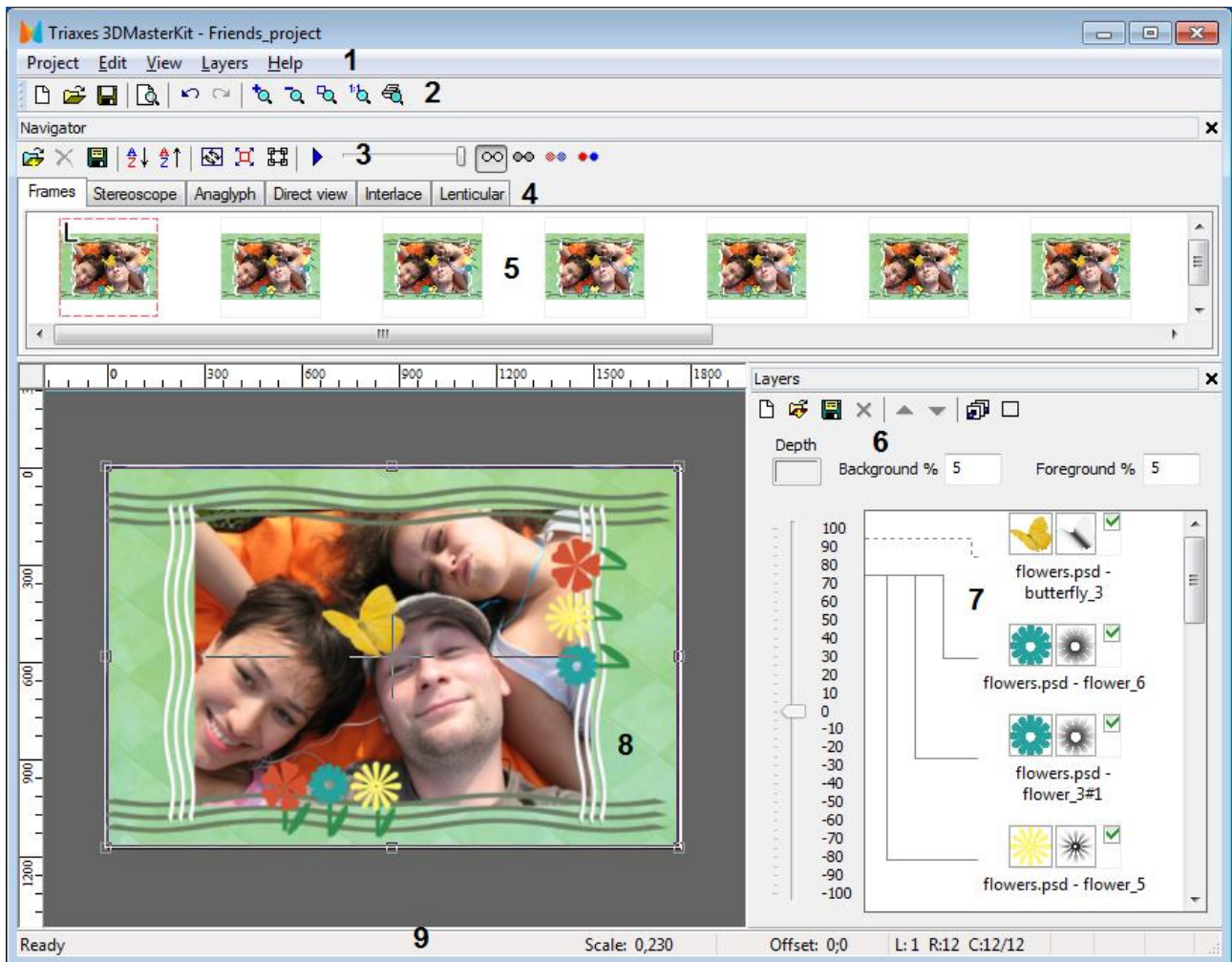The outward appearance of Tiraxes 3DMasterKit main window looks as follows:

Fig. 2.1. General view of the program

Fig. 2.1. indication:

1 – menu line;

2 – main toolbar;

3 – toolbar;

4 – tabs of the Navigator window;

5 – sequence of frames;

6 – layers window;

7 – layers list;

8 – image display area (working area);

9 – status bar.

Detailed description of elements is provided below.

2.4 Navigator window

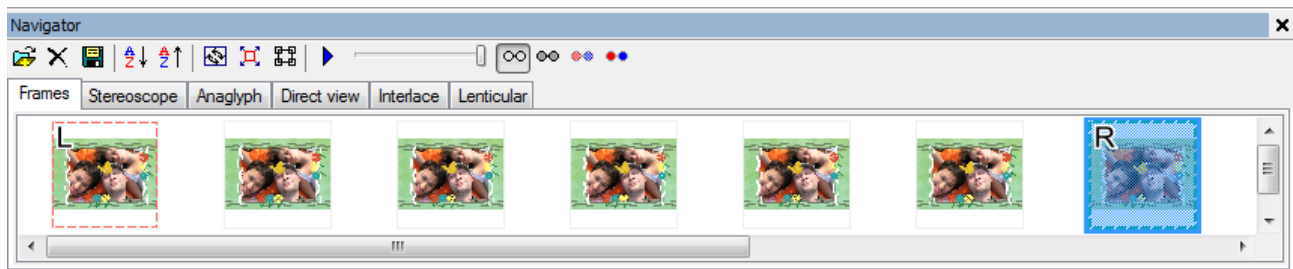The **Navigator** window is used to control projects and create images of various types

Fig. 2.2. Navigator window

Navigator window is located at the upper part of the 3DMasterKit window and contains the following tabs:

- **Frames** tab is used to manage source frames in a project.
- **Stereoscope** tab allows you to obtain images for stereoscope.
- **Anaglyph** tab contains parameters for generating anaglyph images.
- **Direct View** tab contains parameters for encoding images that can be viewed using
- the parallel or cross-eyed methods.
- I**nterlace** tab contains parameters for encoding images that can be viewed with
- LCD shutter stereo glasses.
- **Lenticular** tab contains parameter for generating images that can be viewed through a lenticular screen.

When downloading sequence of frames into a project or generating series of frames out of a layers set, their miniatures are displayed as the list in the **Frames** tab of the **Navigator**

In the upper part of the **Navigator** window there is an additional toolbar, which allows you to manage viewing modes and source frames sorting.

You can either show or hide the **Navigator** window using the **View >> Navigator window** command in the menu or with hot keys **Ctrl+G.**.

Note: working with lists in 3DMasterKit program is similar to working with Windows lists – for mouse group selection use Shift key, for mouse direct selection use Ctrl key.

Useful tip: to "play" frames in turn in order to define perspective of a scene or flip effect, do the following:

1. Set the far right image as *Right frame*. For that click the right mouse button on them and choose **Set right**.

2. In order to make visible only an image, marked as *Right frame*, it is necessary to move slider to the right.

3. Press **Ctrl + left/right arrow** buttons to toggle current image in the frames list.

As a result the frames will be displayed in turn in the main program window. It is a very useful tool because it allows you to manually manage the movement speed and direction.

You can also play sequence of source frames using the **Animation** button of the toolbar or using the menu command **View >> Animation**.
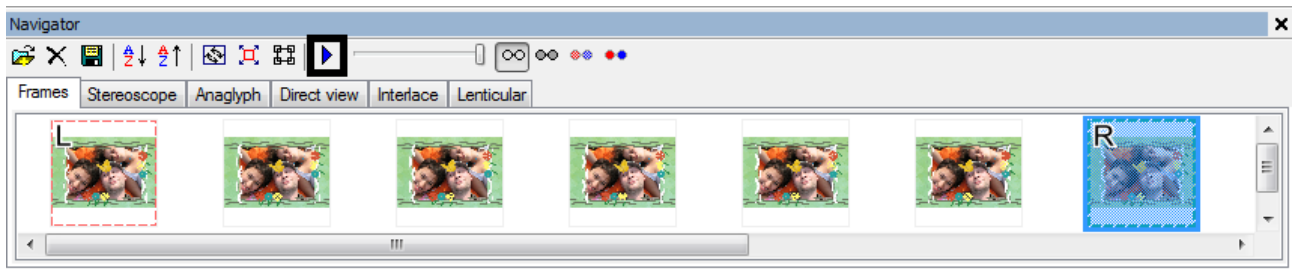
Fig. 2.3. **Animation** button in the toolbar

2.5 Layers window

The **Layers** window is used to produce multilayer stereo images as well as to superimpose layers on generated images: logos, frames, labels, etc.

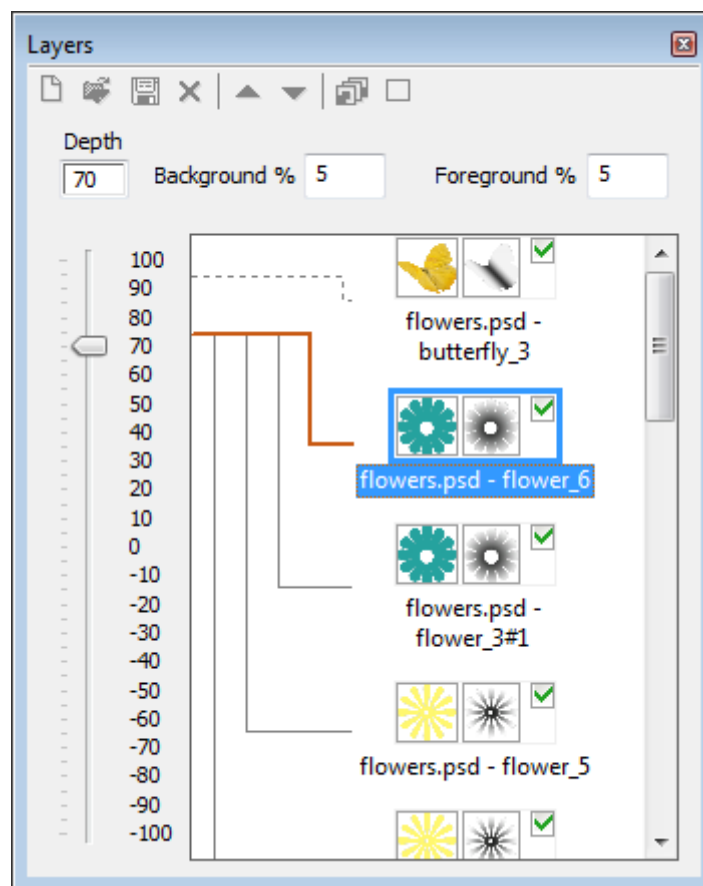There is a toolbar in the upper part of the Layers window:

Fig. 2.4. **Layers** window

Toolbar buttons:

- clear layers list,

> Menu command: **Layers >> Clear**.

- add a layer (or several layers),

> Menu command: **Layers >> Add**.

- save all layers in a .psd file,

> Menu command: **Layers >> Save**.

- delete the current (selected) layer,

 Menu command: **Layers >> Delete**.

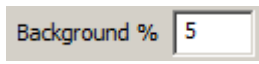 - move the current (selected) layer up,

 Menu command: **Layers >> Up**.

 - move the current (selected) layer down,

 Menu command: **Layers >> Down**.

 - generate a multilayer stereo image,

 Menu command: **Layers >> Generate multilayer stereo (Alt+G)**.

 - hide or show all visible layers,

 Menu command: **Layers >> hide/show all layers.**

A tick mark in the grey frame from the right side of the layer image means the image of that layer will be superimposed on the encoded image. In the multivew sequence generation the sign means that the layer is in generation.

A tick mark in the tool bar of the «Layers» window, allows hiding or showing all layers at once.

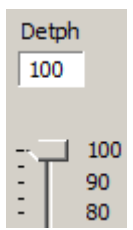### 2.5.1 Background and foreground parallax

 - background parallax.

The value is set as a percentage of the image width and characterizes the maximum remoteness of the background objects. Thus, the greater is the parallax value the more distant is the background image from the viewer.

 - foreground parallax.

This value is also set as a percentage of the image width and characterizes the maximum propagation of the upper (outer) layer in relation to the image plain. The greater is the foreground parallax value, the closer forward the object is moved, the greater is the 3D effect.

The experiments have shown that the best 3D effect is obtained at the parallax value ranging from 5 to 10.

2.5.2 Relative depth scale of a layer

 - Relative depth scale of a layer.

The scale reflects the layer position in space relative to other layers. The depth value is set in relative units and ranges between -100 to 100, where the maximum value (100) corresponds to the foreground objects, and the minimum (-100) – to the most distant objects.

Layers with depth value of 0 lie in the lenticular plane, layers with the depth of greater than 0 are 'elevated' above the lenticular plane, with depth less than 0 – are depressed below.

2.5.3 Adding layer depth map
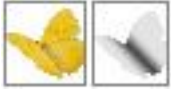
 - layer depth map.

The icon to the right of the image indicates availability of the depth map for this image.

Depth map (Z-image) is a grayscale (black-and–white) image. Pixel brightness in the depth map reflects the remoteness of the corresponding original image pixel from the viewer: lighter parts correspond to objects located closer to the viewer, darker ones- to more distant objects. White pixel in the depth map indicates that the respective source image pixel is the most proximate to the viewer (foreground); black one- most remote (background); variations in grey scale correspond to intermediate (middle) objects.

Using depth map provides an additional volume for objects-layers, resulting in a more natural look and better effect.

In order to add a depth map to the layer, it is necessary to draw the map first, for instance, using Photoshop or GIMP. (Example of manual generation of a depth map is provided here). Then save the map as a separate image with transparency or as a layer in .psd file.

When the .psd or .3ds template is added in the 3DMasterKit layers list, the map can be attached to the layer using one of the two methods:

1) Upload the depth map from a separate file (if the map is saved in a separate .tiff file). To do that, right-click the layer image in the list and select "Upload map from the file" in the context menu.

2) Assign adjacent layer as a depth map (if the map is saved as a layer in the same .psd multilayer file). To do that right-click the layer image in the list and select "Attach upper layer as a depth map" or "Attach lower layer as a depth map" in the context menu.

The resulting project (template) can be saved as .psd file, the map can be edited if necessary. If .psd file is edited and saved in Photoshop it will retain indication of the layer which acts as the depth map.

To display or hide the Layers window from the screen use menu command View>> Layers or hotkeys **Ctrl+L.**

Note: working with lists in 3DMasterKit program is similar to working with Windows lists – for mouse group selection use Shift key, for mouse direct selection use Ctrl key.

Useful tip: to show or hide a group of layers: select upper layer in the list, then click Shift and holding Shift click on the lower layer. Besides, there is a checkbox ☑ – show/hide all layers - in the Layers window toolbar.

2.6 Creating cards for stereoscope

A card for a stereoscope is the image of a stereo pair printed on paper or on other media.

To view such card, you should insert it inside a stereoscope which shows the corresponding image separately to each eye. To create a stereo card, do the following:

1. Create a new project or open an existing one.

2. Add two stereopair frames into the project .

3. Specify, which of the frames is the *Left frame* of a stereo pair and which is the *Right one* and set the zero parallax point.

4. Crop images the way you like.

5. Switch to the Stereoscope tab of the **Navigator** window. A card will be created. You can change the size of the card by entering necessary values. After clicking **Generate**, the card with new size will be generated.

6. Finished card can be either printed or saved to a file. A project can be saved as an .mtp file. All settings will be saved in the project.
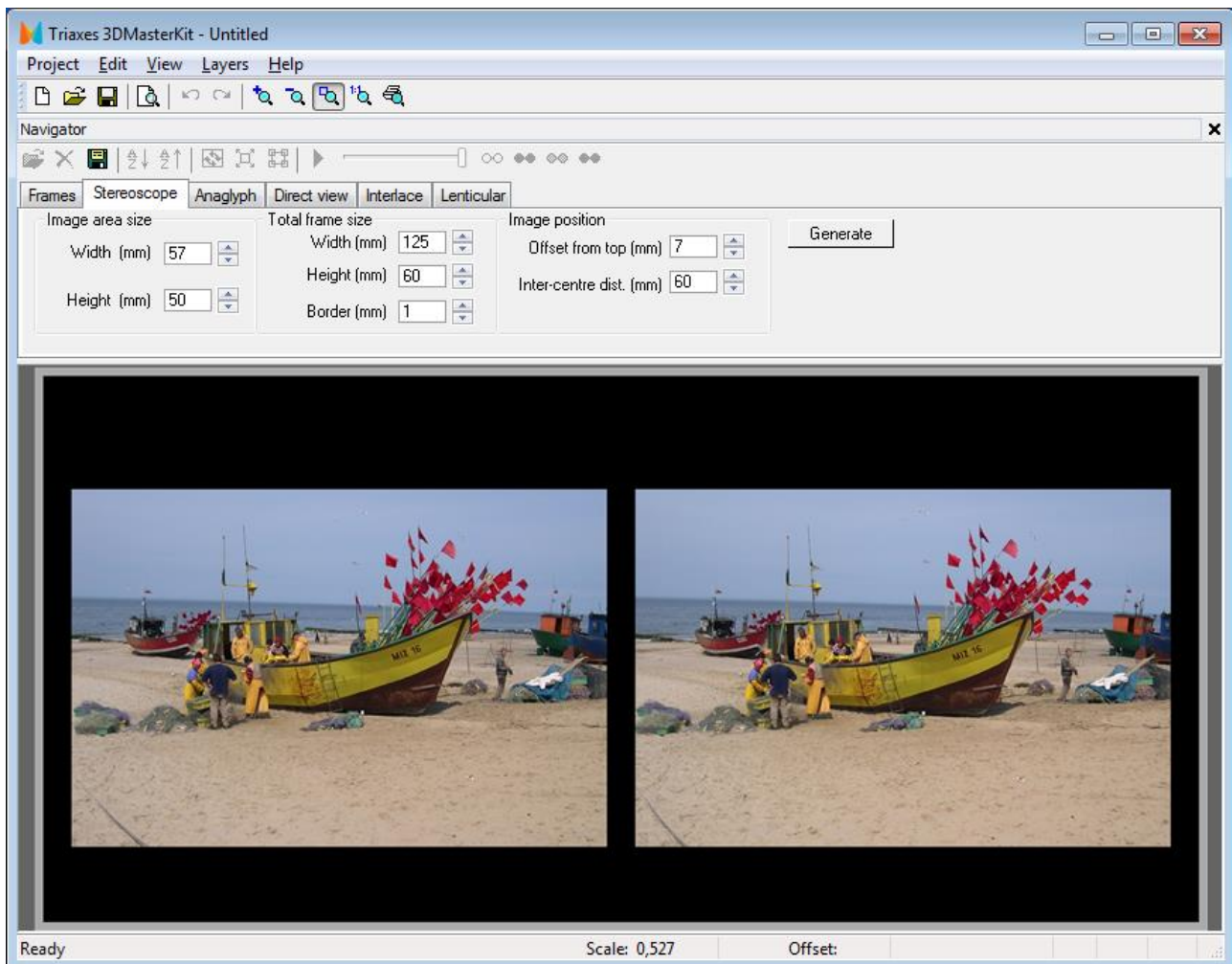

Fig. 2.5. **Stereoscope** tab on the **Navigator** window (photos made by Piotr Nawracała)

2.7   Creating anaglyph images

3DMasterKit allows you to create anaglyph images of the following types: grayscale, subcolor, and color.

To create an anaglyph image, do the following:

1. Create a new project or open an existing one.

2. Add two stereo pairs frames into the project.

3. Specify, which of the frames is the *Left frame* of a stereo pair and which is the *Right one* and set the zero parallax point.

4. Crop images the way you like.

5. Switch to the **Anaglyph** tab of the **Navigator** window (see section 2.4). A color anaglyph image will be created. To change the type of the anaglyph image (color, subcolor, grayscale), you should select the corresponding item in the View Mode groupbox. Color mode is designed for generating anaglyph images with fully saved color rendition, which may cause particular obstacles into the perception of a view

through the anaglyph glasses: red and blue-green colors present in frames may get on the eye retina, for which they are not suited, and thus may cause discomfort. Grayscale and subcolor modes can be used to eliminate those defects.

6. Finished image can be either printed or saved to a file. The project can be saved as an .mtp file. All changed settings will be saved in the project.
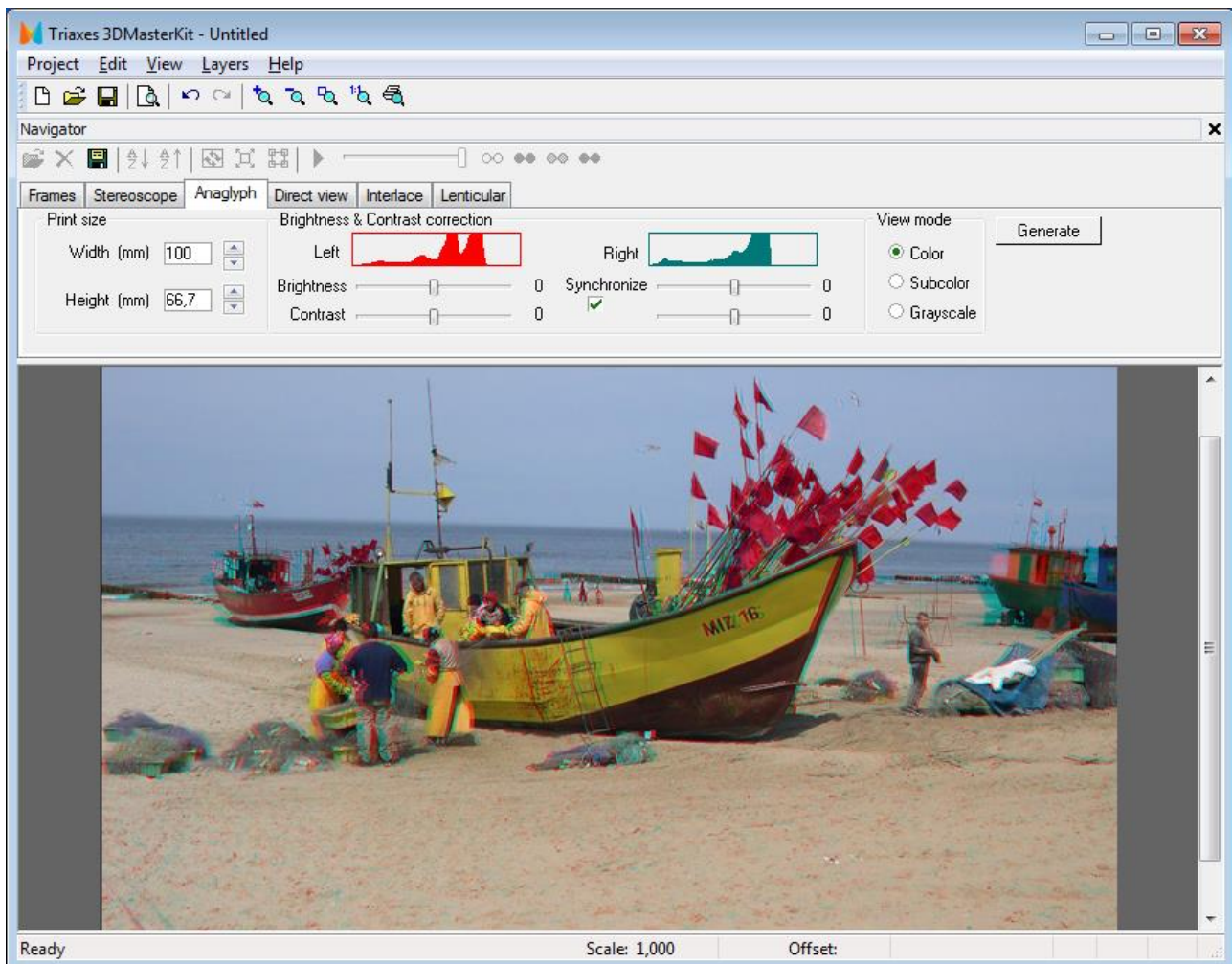

Fig. 2.6. **Anaglyph** tab on the **Navigator** window (photos made by Piotr Nawracała)

In the **Anaglyph** tab you can specify the size you want to use for printing. When you change the size, the proportions of the image are retained. You can change them by cropping the image. Here you can find the image brightness histogram and control elements which allow to change brightness and contrast either separately or simultaneously in each of the color channels used in an anaglyph image.

After you click **Generate**, the image with the specified parameters will be generated.

2.8 Creating stereo pairs for direct view

You can obtain a stereo pair for direct view performing the following:

1. Create a new project or open an existing one.

2. Add two stereo pairs frames into the project.

3. Specify, which of the frames is the *Left frame* of a stereo pair and which is the *Right* one and set a zero parallax point.

4. Crop images the way you like.

5. Switch to the **Direct View** tab of the **Navigator** window. This will create an image for parallel view. To change the type of the generated image (parallel or cross-eyed), select the corresponding item in the View Mode group.

6. You can save finished image to a file. A cross-eyed image can be saved in the jps format which is commonly used to save stereo pairs (jps is jpeg format, the letter "s" indicates a saved stereo pair for the cross-eyed view) The project can be saved as an .mtp file. All changed settings will be saved in the project.
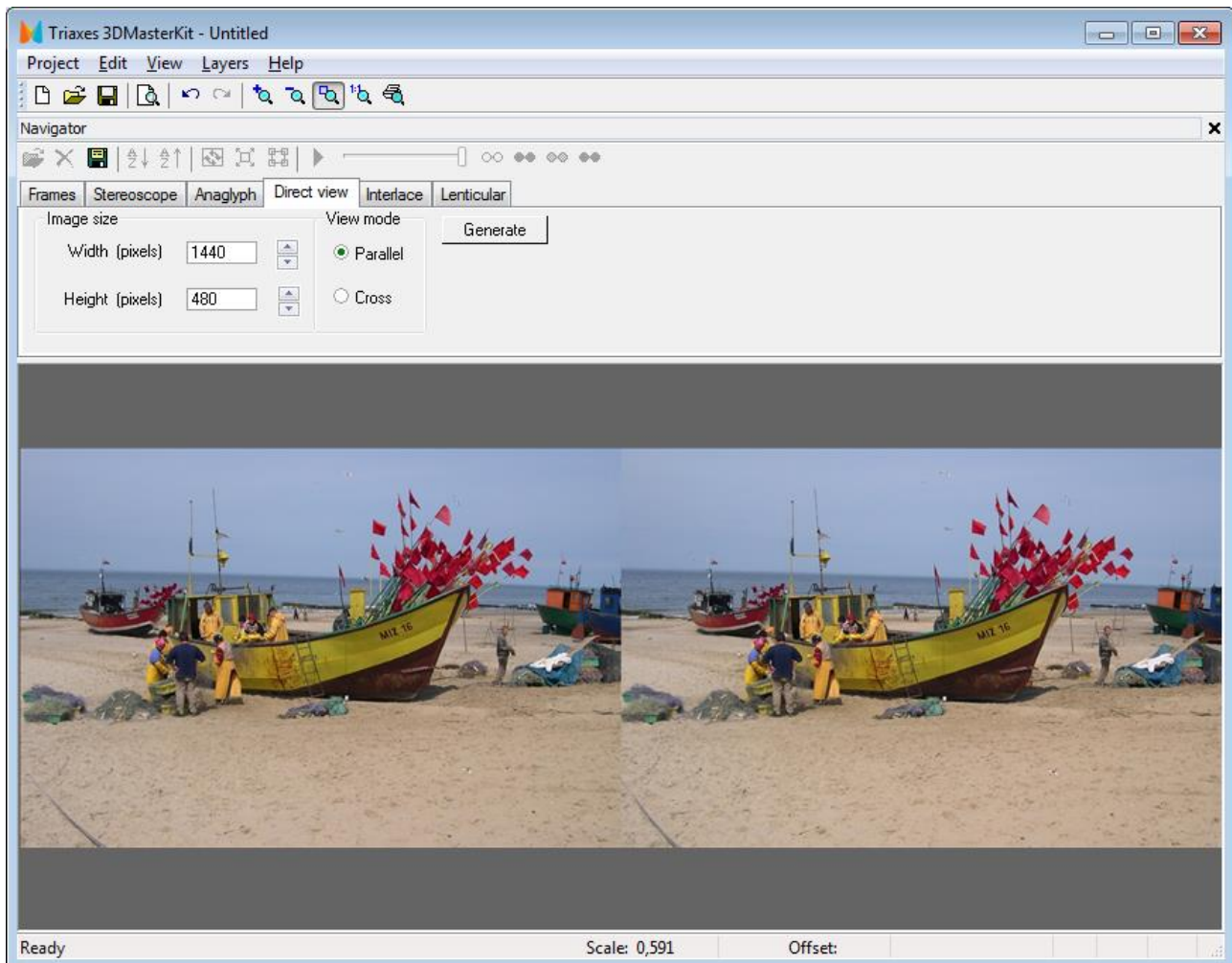

Fig. 2.7. **Direct View** tab of the **Navigator** window (photos made by Piotr Nawracała)

You can specify the required size of the image (in pixels) in the **Direct View** tab. When you change the size, the image proportions are kept. You can change the proportions by cropping image.

After you click **Generate**, the image with the specified parameters will be generated.

2.9 Encoding images for viewing with LCD shutter glasses

The images designed for viewing through LCD glasses consist of interlaced lines of the left and right frames. The video card driver shows images and synchronizes the process with glasses. 3DMasterKit allows you to prepare images for such viewing.

You can create an image viewed with LCD shutter glasses, perform the following:

1. Create a new project or open an existing one.

2. Add two frames into the project.

3. Specify, which of the frames is the *Left frame* of a stereo pair and which is the *Right* one and set the zero parallax point.

4. Crop images the way you like.

5. Switch to the **Interlace** tab of **Navigator** window. This will create an image for viewing through LCD stereo glasses. There are two ways to generate an interlaced image (the View Mode group):

   - l/r – in this mode every even line is taken from the left frame, every odd- from the *Right frame*

   - r/l – in this mode every odd line is taken from the left frame, every even - from the *Right frame*

6. You should choose the encoding method taking into account the capabilities of your video card driver.

7. You can save finished image to a file. The project can be saved as an .mtp file. All changed settings will be saved in the project.
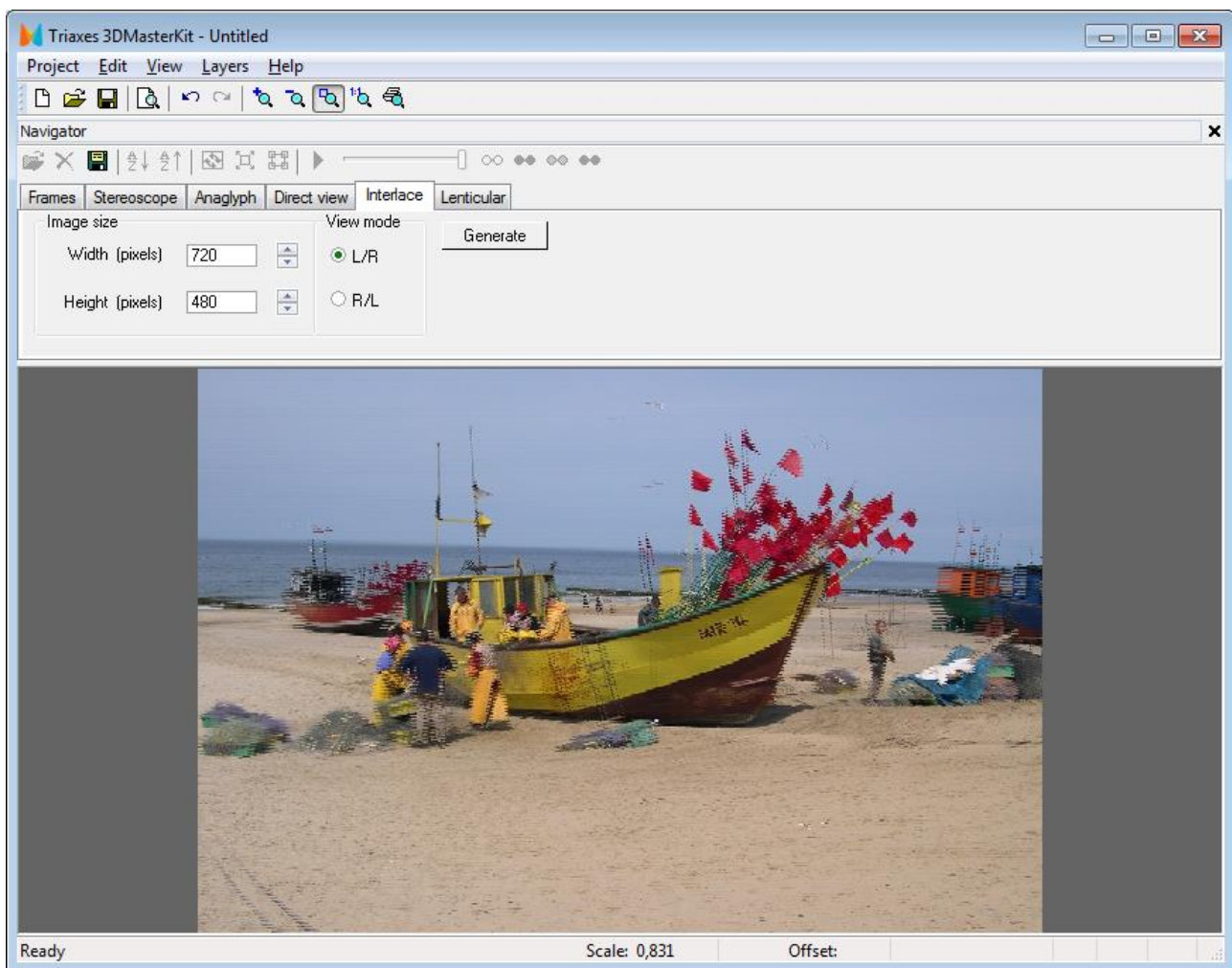

Fig. 2.8. **Interlace** tab of the **Navigator** window (photos made by Piotr Nawracała)

You can specify the necessary size of the image (in pixels) on the **Interlace** tab. When the size is changes, the proportions of the image are retained. You can change the proportions by cropping an image.

After you click **Generate**, the image with the specified parameters will be generated.

2.10   Encoding images for viewing via lenticular screen

3DMasterKit software allows to prepare images for viewing through a lenticular screen.

To create this kind of images do the following:

1. Create a new project or open an existing one.

2. Add a multi-view sequence of frames into the project. Sort frames in the list so, that they are located in the order of shooting from left to right.
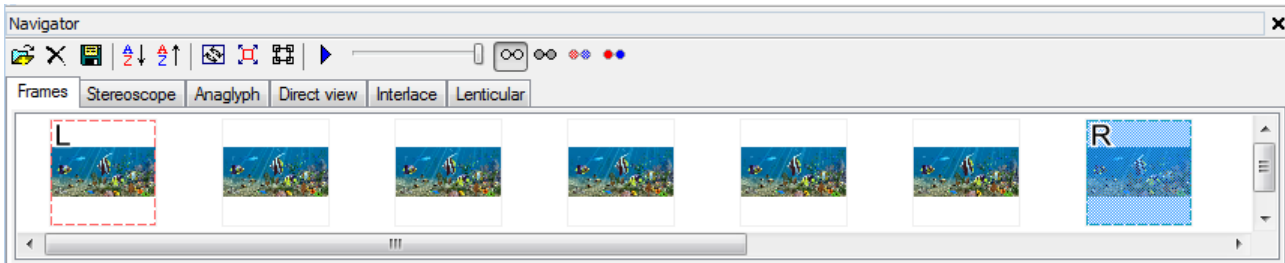

Fig. 2.9. Navigator window. The sequence of frames

3. By means of the context menu, openning by the right mouse button click, set the leftmost frame of a series the *Left frame* and the righmost – the *Right* one. Perform alignment of the *Left frame* with the *Right* one by a chosen object, which will locate in zero parallax. Then execute **Edit >> Automove** menu command. As the result, all the inbetween frames will be aligned. After that, it is necessary to select all the rest frames in turn (make them *Active*), in order to make the final vertical and horizontal adjustment as well as zero parallax point adjustment, if it is necessary.

4. In case it is necessary to use not all images of the uploaded series, for example, in order to decrease parallax of a scene, you can select a necessary sequence of frames by setting the outermost frames of the sequence as *Left* and *Right* ones.

5. Crop images the way you like using **Crop rect**.

6. Switch to the **Lenticular** tab on the **Navigator** window. Set the parameters of the lenticular material and print size then click **Generate**.

7. Generated (interlaced) image can be either printed or saved to a file.

Useful tip: The program has a feature of saving to a file simultaneously with generating. It is convenient to use this feature when creating lenticular images of large sizes. The **To file** option allows you to significantly speed up the generating process. Besides, in case there is not enough RAM to display the lenticular image on the screen, you can still create it with the help of the option of direct encoding to file. The image is generated either to a Photoshop .psd file (with the support of CMYK color model) or to Windows bitmap .bmp format.

The project can be saved as an .mtp file. All changed settings will be saved in the project.
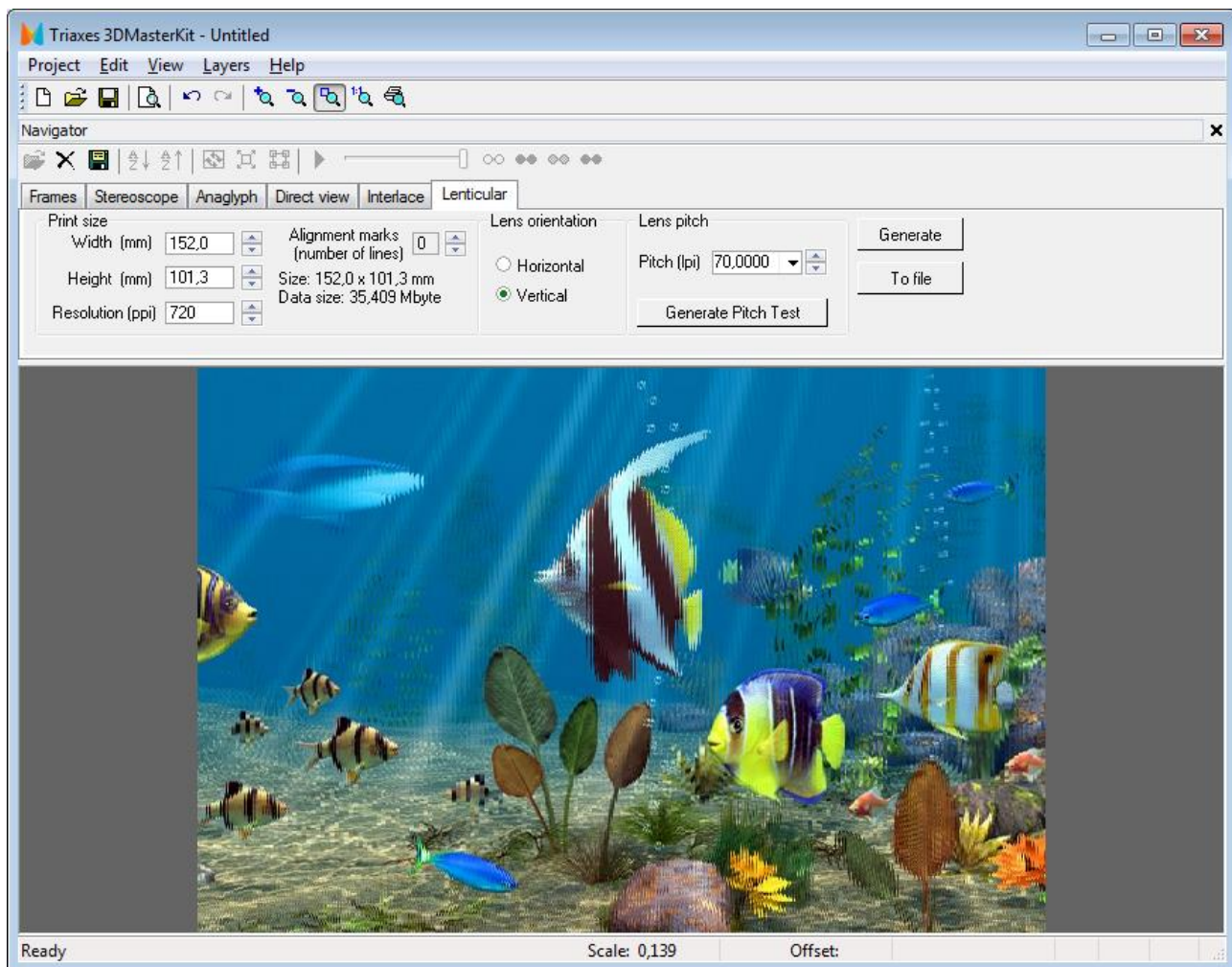
Fig. 2.10. **Lenticular** tab of the **Navigator** window (photos made by Andrezej Pędowski).

2.10.1 Encoding parameters

The **Width** and **Height** parameters allow to specify the image size (in millimeters) you want to use for printing. When you change the size, the image proportions are retained. You can change proportions by cropping the image using **Crop rect** (Frames tab).

The **Resolution** parameter defines a resolution of an encoded image in **ppi** (pixels per inch). In most cases it is recommended to set the resolution equal to a resolution of a printer you use in ppi. Note, that printing resolutions are indicated in **pdi** (dots per inch). Values, which are specified by printer manufacturers, can be up to 5440 pdi and more. However, it is necessary to distinguish pdi resolution from ppi resolution. When processing in the program, a digital image resolution is measured in ppi. When an image is printed, every pixel is represented by several color dots. That's why the printing resolution in pdi is higher than digital image resolution in ppi. At the same time, printer driver processes images with the resolution defined in ppi. For Epson printers this resolution usually is 720 ppi, for Canon printer - 600 ppi. Use the **Preview mode** or the **Pitch test** dialog to find out printing resolution in ppi.

Before printing an image, the program by the request of the printer driver sets the image to the resolution (in ppi) which the driver is capable to process. So if you create an image for printing, you are advised to use the printer resolution in ppi. It would save both generation time and required memory size.

Note: The **Resolution** parameter has a direct influence on information transmission from the source frames sequence to the encoded image. When specifying resolution, you should take into account that the higher the value of this parameter the larger the encoded image will be (in bytes) and the longer it will take to encode it. On the other hand, small values set for this parameter will cause to detriment of image quality.

The minimal number of source frames can be calculated in the following way:

$$Nmin = Res/Pitch$$

Where **Nmin** is the minimal number of frames, which is needed to get satisfactory 3D effect and **Pitch** is a pitch of a lens measured in lenses per inch (lpi). For example, if the resolution equals 720 ppi and the pitch is 60 lpi (Pitch=60), then Nmin is 12. So it is better to use at least 12 source images to create 3D in this case.

The **Alignment marks** parameter allows adding a special border to the encoded image. This border will help you to align the lenses of the lenticular screen parallel to the encoded stripes on the image when performing attachment. Adding the marks increases the size of the image.

Fig. 2.11. Alignment marks for encoded image

Image encoding can be performed for a lenticular screen with either horizontal or vertical lenses orientation. The direction of lenses is set in the **Horizontal/Vertical** option. You should set vertical direction of lens for stereo images (in respect to the horizon line). Dynamic images (flip, morph, etc.) can have any lens direction; however, most typically horizontal lenses orientation is used. The **Pitch** parameter defines the width of the lens base. This value is specified in lpi (lenses per inch). You can select the value from the drop-down list or type it using the keyboard.

3DMasterKit Professional edition allows encoding an image part by part. It may be useful when you have to print a large format image. For more details see section Canvas and image cropping.

Useful tip: Sometimes when lenticular screen is imposed on printed image the color moire effect occurs (periodical stripes running over the image). This effect appears due to the interference of the lenticular lens with the color dots of image. The effect occurs when using printers with regular method of color dot formation. To reduce the moire effect, sometimes it is useful to rotate the image before printing. Rotation angle is defined in the

following way: you must apply a lenticular screen onto the printed image and rotate until the moire disappears. This angle can be measured with protractor or using mathematical formulas (arcsin, arctg etc.). The rotation of the image to the appropriate angle during printing should prevent color moire effect.

Rotate with the Rotate dialog.

Menu command: Edit>>Transform>>Rotate Precise

Hot keys: Ctrl+Alt+R

Toolbar button: [icon].

Attention: To get a high quality lenticular image you have to perform a pitch test prior to encoding to correct the encoding pitch.

2.10.2   Correcting the encoding pitch

To get a high quality lenticular image, the pitch of the lenticular screen has to precisely match the width of encoded stripes in the image.

To identify the precise encoding pitch it is necessary a pitch test should be performed prior to generating an encoded image. The pitch test is conducted once for every type of printer, for every type of paper, for every type of printer settings and for every type of lens.

A fragment of pitch test is shown in the picture (fig. 2.12). The test represents a set of stripes, each of which contains coded lines which have their own pitch different from the neighboring stripe by the value of the **Correction step**. To find out the necessary value of pitch correction, you should print the test using the printer and paper on which you are going to print the encoded image.
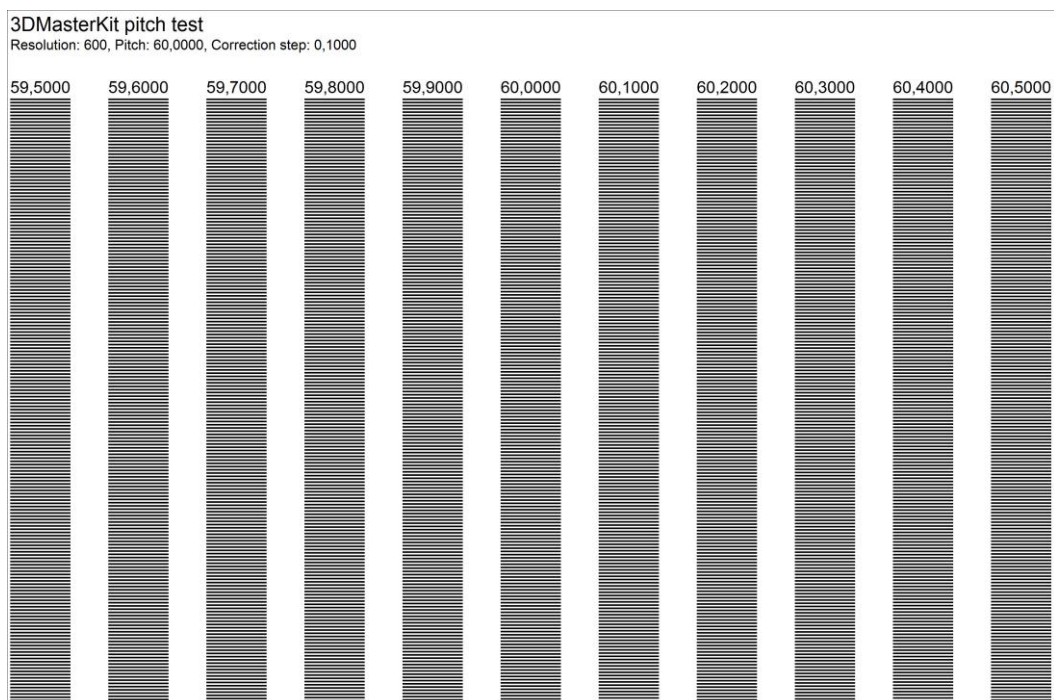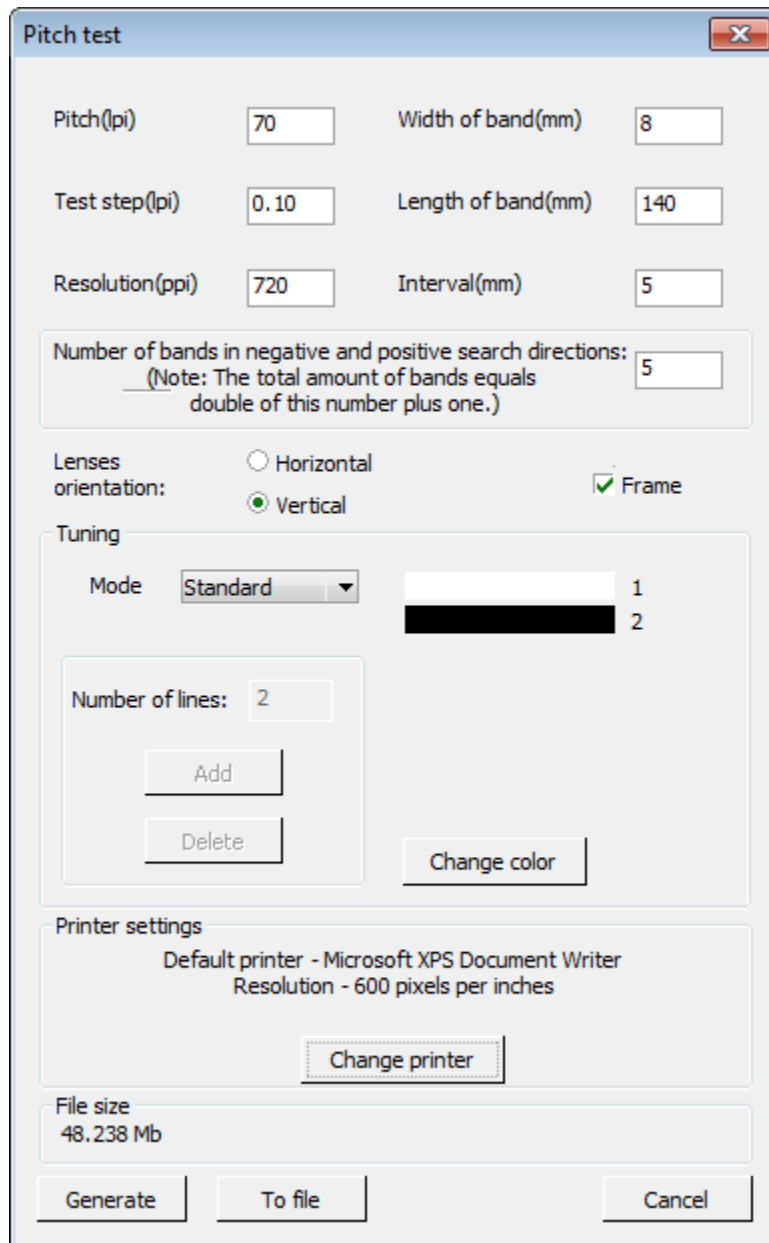

Fig. 2.12. Lenticular pitch-test

To generate the pitch test, you have to switch to the **Lenticular** tab of **Navigator** window. and press **Generate Pitch test**. After that, you will see Pitch test dialog as shown in the Fig. below. You can specify the necessary parameters of the test page in this dialog.

Fig. 2.13. Pitch-test generation dialog

The value of the tested pitch is set in the Pitch field and is specified in lenses per inch (lpi).

The distance between lines in each stripe can be specified in the **Test Step** field. As a rule, at first, the step value of 0.1 is tested, the stripe which more precisely and sharply renders switching between colors of the background and stripe, is fixed. After that a qualifying pitch test is performed with the step of 0.01 lpi.

Use the **Resolution** field to specify the printer resolution (in ppi). It is recommended to enter the resolution which will be used to encode the lenticular image.

Besides, you can set the length and width of stripe, the quantity of stripes and the distance between them, direction (horizontal or vertical), printer resolution as well as the background color and lines constituting the stripes.

Frame checkbox allows the lenticular screen to be applied correctly to the printed pitch test. A pixel-wide frame is placed around the pitch test, which allows it to be aligned with the lenticular screen appropriately. To perform this, apply lens to pitch test in such a way so as to view black frame at a certain angle throughout one lens along the full length.

Click **Select printer** to choose one of the installed printers in the system. Printer name and its resolution(pixels per inch) appear above the button.

By clicking **To File** you can save the generated pitch-test into a file.

File size field will indicate the generated file size (raster data) or prompt error message in case of input error:
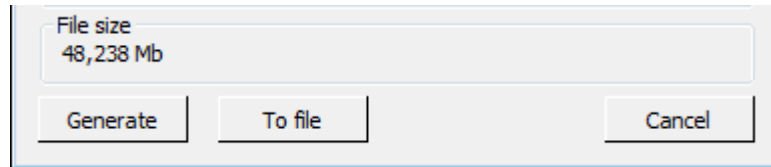

Fig. 2.14. **File size** field in the **Pitch-test** generation dialog

Pitch test generates in three modes: **Standard, Thin,** and **Custom**.

Standard mode generates two lines of 1:1 size for every lens. Color can be set by double -clicking on the line's images or on a chosen line and clicking **Change Color.**

Thin mode generates two stripes of 1:N size, where N depends on **Resolution/Pitch** ratio. The mode is very convenient to ascertain the real printer resolution. It allows you to define visibility of every single frame.

Custom mode provides complete freedom to the 3DMasterKit user in terms of settings choice: one can adjust number of lines and its color, etc.

Lines number can be typed in directly in **Lines number** field or changed with **Add** and **Remove** buttons.

The lines on the test sheet are numbered and there is a specified period of stroke following for each line (analog of the lenticular pitch).

To find the best pitch for lenticular encoding you have to:

1) apply lenticular material to the test sheet (with the smooth side) so that the strokes of test stripes match the lenses

2) look at the lenticular image so that the view direction is perpendicular to the lense orientation, at a distance from which the item is observed optimally (30-50 cm for images 10-30 cm width, from 1 m – for large width interior design items)

3) altering the angle of observation (moving forward and backward in respect to the lenticular image), identify the code stripe which changes its color simultaneously along its full length. Use the pitch period of this stripe when encoding the image (enter the pitch value into the field **Pitch** (lpi)).

| A | Б |
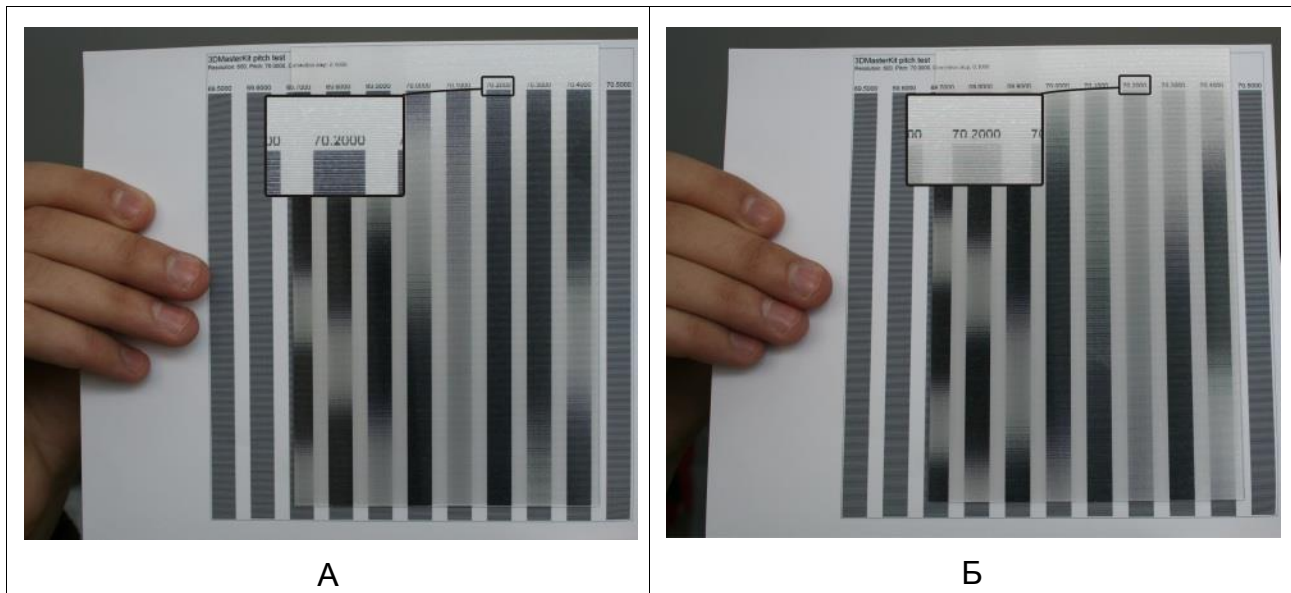
Photos A and B show identification of proper pitch for lenticular lens of 70 LPI. The optimal value is determined as 70.2 LPI.

For more information read this guide: Pitch-test.

2.11 Generating multilayer stereo images

Taking a sequence of photos for making a lenticular stereo image requires special conditions: a still object, a tripod for the camera and the same lighting during the whole photography session. Besides, photos often need to be corrected – askew images, shifted frames (these operations can be fulfilled in 3DMasterKit or Photoshop). If you follow all these rules, you will get a perfect stereo photo as a result.

However, for creating collages, imposing photo objects on pictures or performing professional design work, there is a special method which allows to create stereo pieces from a set of "flat" layers – the method of multilayer stereo generation.

Multilayer stereo image (the so called pseudo-image) – is an encoded sequence of source frames obtained through setting non-zero parallax for one or more photo layers. By layers we mean photographs, frames imposed on them, and other photo objects)

The distance to objects (layers) of the multilayer stereo image is determined by parallax values. The object "in focus", i.e. perceived by both eyes equally, without displacement, is an object with zero parallax. Distance to all other objects in the back- or foreground will be evaluated in respect to this object.

3DMasterKit allows preparing a sequence of frames from a set of layers with transparency and then encoding it, i.e. obtaining a multilayer stereo photograph. The final image will have layers located at a different distance from each other, which would provide for a stereo effect.

Sequence of steps when creating a multilayer stereo image:

1. Create a new project or open an existing one.

2. Add files with layers into the project.

3. Arrange layers in the necessary order on the canvas.

4. Set the background and foreground parallax values

5. Arrange layers in terms of depth using the depth scale

6. Run the menu command of generating frames sequence: **Layers >> Generate multilayer** Alt+G), in the dialog window specify the background, foreground, and zero parallax layer (automatically) or set the parallax values for each of the layers (manually);

7. Use the **Project >> Export frames** menu command to save generated series of frames.

8. After that you can follow the procedure described in the previous sections - to encode images of any type: lenticular, anaglyph, etc.

Please, see section 4.2 for a step-by-step guide on creating multilayer stereo photographs.

3. BASIC OPERATIONS

This section describes basic operations performed in 3DMasterKit.

3.1 Working with a project

The essence of 3DMasterKit program is that it creates stereo image from a set of frames for various kinds of viewing.

A combination of settings (links between the files of source images, the method of superimposing images and their relative orientation, as well as encoding parameters) is called 3DMasterKit project.

3DMasterKit project can be saved to a file, which can be opened later to continue working with. The extension of 3DMasterKit project files is mtp.

Mind, that only program settings and links between source images are saved in 3DMasterKit project. The source images themselves are neither saved nor modified in any way. Paths to files with source images are saved according to the location of the project file. That is why when you move (or copy) a project file to a new location on the disk, you should also move its source images.

It is convenient to store source images and project files together in the same directory (folder).

3.1.1 Creating a new project

Menu command: **Project >> New Project**

Hot keys: **Ctrl+N**

Toolbar button:

3.1.2 Saving a project

Menu command: **Project >> Save Project**

Hot keys: **Ctrl+S**

Toolbar button:

3.1.3 Opening a project

Menu command: **Project>>Open Project**

Hot keys: **Ctrl+O**

Toolbar button:

Opens the project saved previously.

3.1.4 Adding frames into a project

Menu command: **Project>>Add frames**

Hot keys: **Alt+Shift+O**

Toolbar button:

The **Add frames** command opens the **Open Source Images** dialog. This dialog allows to select one or several image files that should be added into a project. The left part of the dialog box contains the group of control elements from the standard Windows Open file dialog. The right part of the dialog box contains the list of selected files. To choose a file,

select its name in the left list and click the button with an arrow →. Holding down the **Shift** (or **Ctrl**) key, you can select several files at once.
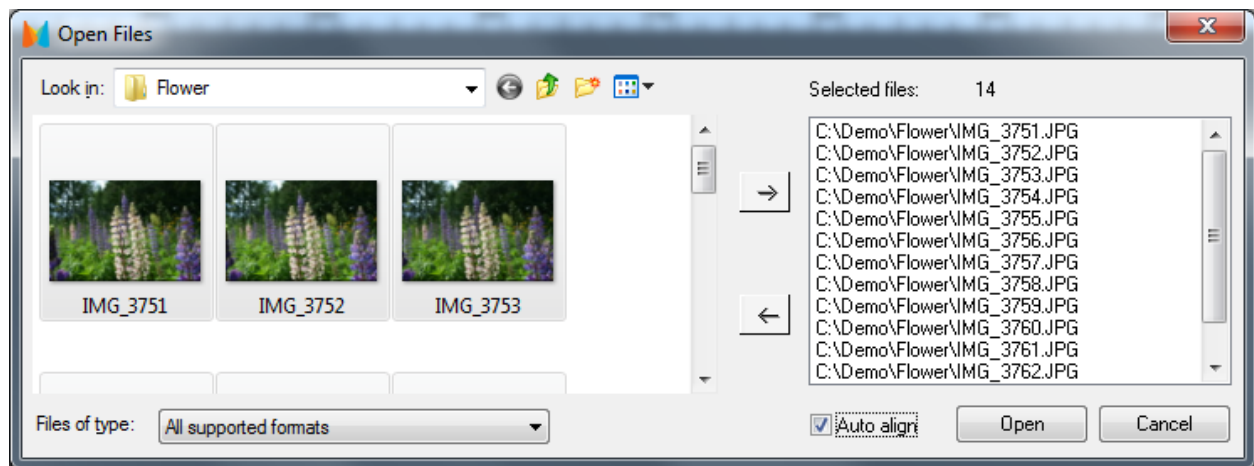

Fig. 3.1**. Open source images** dialog

To delete a file or several files from the right list, select it/them with the mouse and click the button ←. A double click with the left mouse button also removes file names from the list.

To load the selected files to project, click the button **Open**. If the **Auto align** option is checked the loaded images will be aligned relative to the first image of the sequence.

Supported for opening formats:

format	description
bmp	A file format for bitmap images storing without data compression and losses in their quality.
tiff	A file format for bitmap images storing with some compression but without losses in their quality. Tiff file is in average two times smaller than bmp file.
jpg	A file format for bitmap images storing with some compression and some losses in their quality. The file size is in average 40 times smaller than a bmp file. Quality loss can be expressed in slight color corruption and appearing artifacts peculiar to the jpg compression. The quality level approximately corresponds to 7-8 (Medium-High). It is not recommended to save lenticular encoded images in this format.
jps	The same as jpg. The letter s at the end means that the file contains a stereo pair of images for the cross-eyed viewing. Special software for viewing stereo pairs recognizes files of this type.
png	A spread storing format for bitmap graphic information using some compression without losses in quality.
gif	A storing file format for graphic images with indexed color palette.
psd	A storing format for bitmap graphic information using some compression without losses in quality, which was created especially for Adobe Photoshop software.
3dm	A special file format which was created to store multilayer templates of the 3DMasterKit software.

Mpo	A file format for bitmap images storing, using in Fuji FinePix REAL 3D W1 3D camera. It contains 2 images in jpg format with special technical information.

Tab. 3.1. Formats supported for opening

3.1.5   Adding layers into a project

Menu command: Layers >> Add

Hot keys: Ctrl+Shift+O

Toolbar button:

The Add command opens the Open Layers dialog. You can find more detailed description of this dialog in the previous section.

Supported for opening formats are given in the previous section (Adding frames into a project)

3.1.6   Deleting a current image from a project

Menu command for frames: **Edit >> Delete**

Hot keys: **Del**

To delete an image (either a source frame or a layer) from a project, click on it and press **Delete** or execute corresponding menu command. Besides, you can delete the current layer using a special button ❌ on the Layers window that is used (see section 2.5).

Using Shift and Ctrl you can select and delete the set of images from a project.

3.1.7   Saving images

Saving the generated images out of the Stereoscope, Anaglyph, Direct view and Interlace tabs.

You can save generated image to a PC.

Menu command: Project >> Save Generated Image

Hot keys: Ctrl+Shift+S

Toolbar button:

You can save images in the following formats:

Format	Description
Bmp	Saving images without data compression. Images are saved without losses in their quality.
Tiff	Image data are compressed without losses in quality. Images are saved to a file that is in average two times smaller than a bmp file.
Jpg	Image data are compressed with some losses in quality. The file size is in average 40 times smaller than a bmp file. Quality loss can be expressed in slight color corruption and appearing artifacts peculiar to the jpg compression. The quality level approximately corresponds to 7-8 (Medium-High). It is not recommended to save lenticular encoded images in this format.
Jps	The same as jpg. The letter s at the end means that the file contains a stereo pair of images for the cross-eyed viewing. Special programs for

| | viewing stereo pairs recognize files of this type. Available out of the **Direct view** tab. |

Tab. 3.2. Formats supported for saving source frames

When lenticular image is encoded **To file** saving will be executed in the Photoshop .psd format (supports RGB and CMYK color models), or in the Windows bitmap .bmp (RGB only). If necessary, the extension will be added to the entered file name automatically.

3.1.8   Saving frames

For saving frames out of the **Frames** tab (generated series of multilayer frames or aligned and cropped sequence of source frames), use menu command **Project >> Export Frames**. In case of exporting only the area of images is saved, which is inside the crop rectangle.

Image export dialog is shown in Fig. 3.2. In the drop-down list in the bottom you can choose a type of created file (bmp, jpg – to create series of pictures; gif, avi — to create an animation file).
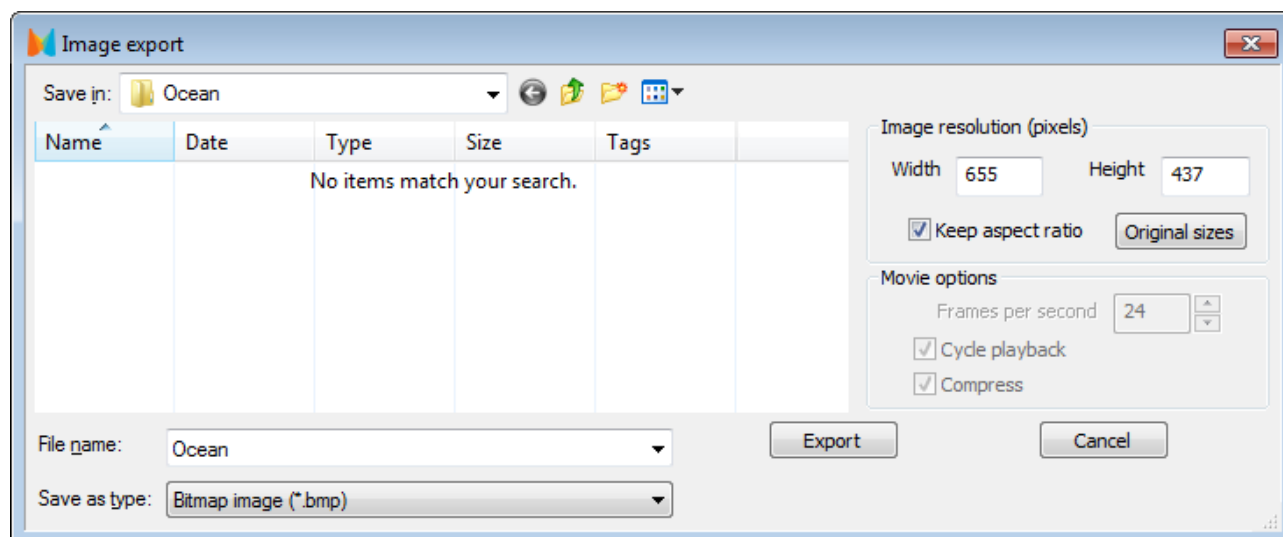
Fig. 3.2. **Image export** dialog

Supported file formats:

Format	Description
Bmp	Saving images without data compression. Images are saved without losses in their quality.
Tiff	Saving images with insignificant compression. Images are saved almost without quality loss.
Jpg	Image data are compressed with some losses in quality. The file is in average 40 times smaller than a bmp file.
Gif	Frames are saved into a video. Derived file is convenient to allocate on web sites.
Avi	Series of frames are saved into a video. Derived file has a better quality than Animated Gif
Psd	Saving images in Photoshop format.

Tab. 3.3. Formats supported for saving frames out of the Frames tab

In the **Image resolution (pixels)** box you can change the size of an image (in pixels). The **Retain the proportions** checkbox means that, when **Width** or **Height** is changed, resolution is automatically re-calculated so as to save original ratios of width to height. The **Original sizes** button allows you to restore original sizes of images.

In the "Animation options" box you can specify parameters of the created video (active only for gif and avi file's type): playback speed (frames per second), cycle playback, compression.

If **Cycle playback** box is checked, the video which can conveniently be reproduced several times is created. Such video contains frames from first to last and back to first. If the **Cycle playback** box is not checked – the video with frames only from first to last is created (with smaller file size).

When the **Compress** box is checked (active only for avi file's type), compression by standard video-codec is taking place. Such file occupies much less disc space.

3.2. Generating a sequence of frames for multilayer stereo image

Menu command: Layers >> Generate multilayer stereo

Hot keys: Alt+G

The generation process is described in section 2.11

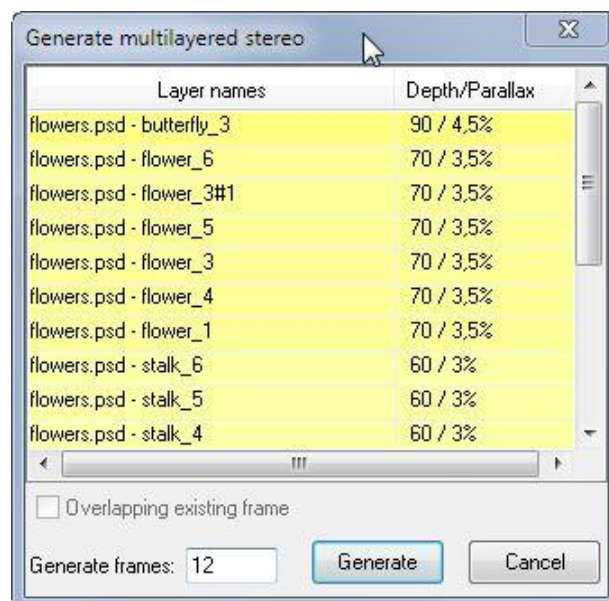You will see the following dialog after you select the command:

Fig. 3.3. Generate multilayered stereo dialog

With the generate window it is necessary to specify the number of resulting frames. Depending on the specified parallax, the line in the list will be illuminated with tint of blue or yellow color. Yellow means, that the layer will be "elevated" from the medium plane, blue - that the layer will be depressed. The farther away the layer moves from the medium plane the more saturated the tint of the list line will become. Besides, color indication of parallax, allows avoiding errors associated with "-" marks.

After generation multilayer images are already aligned to a zero parallax layer. Correction of the relative position is not necessary, you may begin to encode right away.

To save generated frames sequence, use the menu command **Project >> Export Frames.**

3.3   View modes

3.3.1   Sorting

Frames are added into a project in the order in which you select their names in the **Open Source Images** dialog (see Fig. 3.1). The list of images in the project is displayed in the **Frames** tab of the **Navigator** window.

The sequence of images in the list influences the result of lenticular encoding. Images must be arranged in the order of shooting from left to right. The **Frames** tab has two buttons: **Sort descending** and **Sort ascending**, which you can use to sort images by their file names in alphabetical (**A-Z**) or counter-alphabetical (**Z-A**) order.

3.3.2   Changing transparency

In order to simplify the process of images' position correction towards each other, the *Active image* (an image selected at the moment) is shown overlapped on an image, set as the *Left frame*. At that time, you can regulate transparency of the *Active image* towards the *Left frame* with the help of the **Transparency slider**. The leftmost position of the slider corresponds to the full transparency of the *Active image*. At that time, only an image, set as the *Left frame* is seen on a screen. The rightmost position of the slider corresponds to the full opacity of the *Active image*.
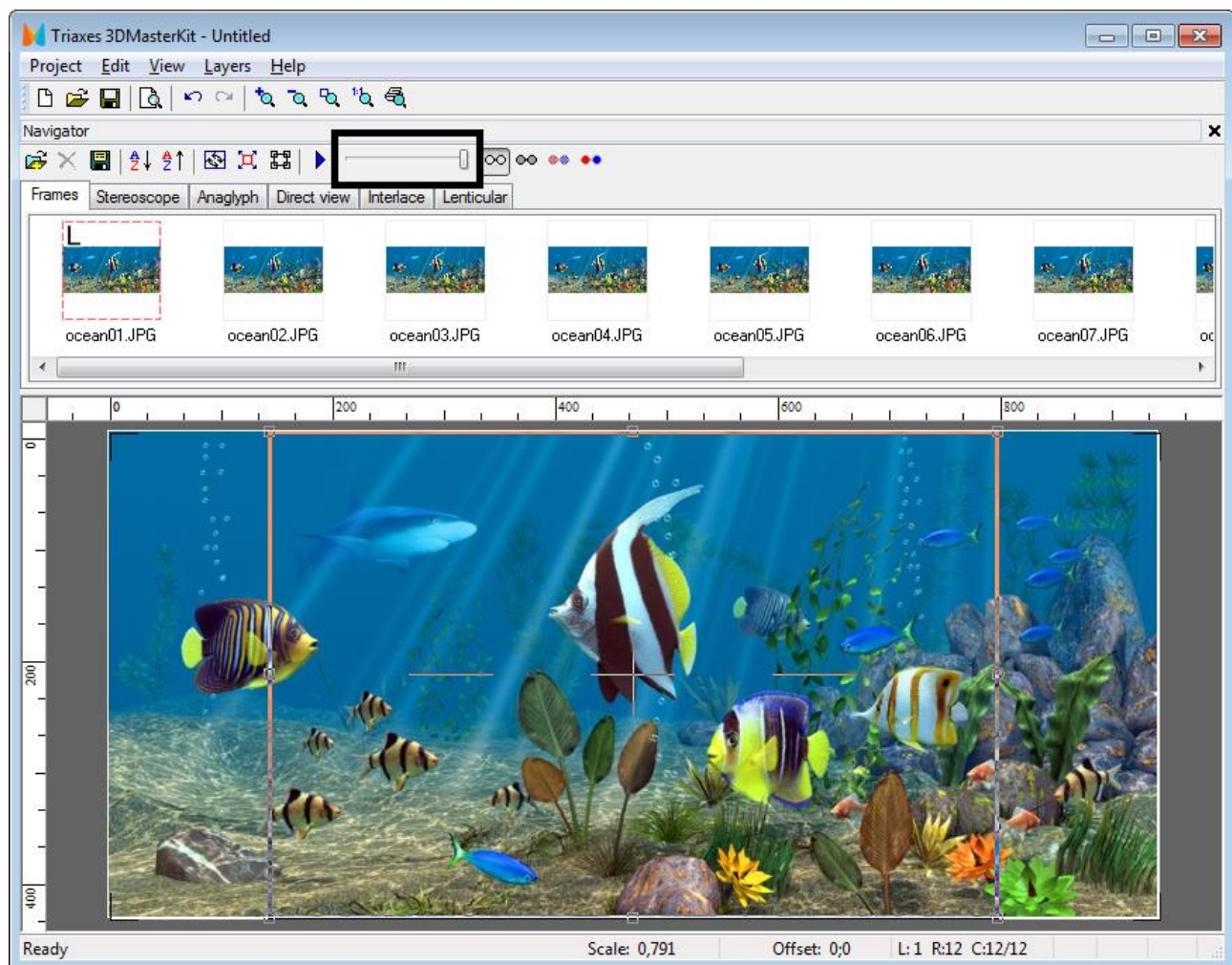
Fig. 3.4. Changing the frames transparency

Currently in all editions there is a new ability to keep the transparency of the source frames. During the lens encoding process the area with a transparent layer, which lies within the crop rectangle, remains transparent.
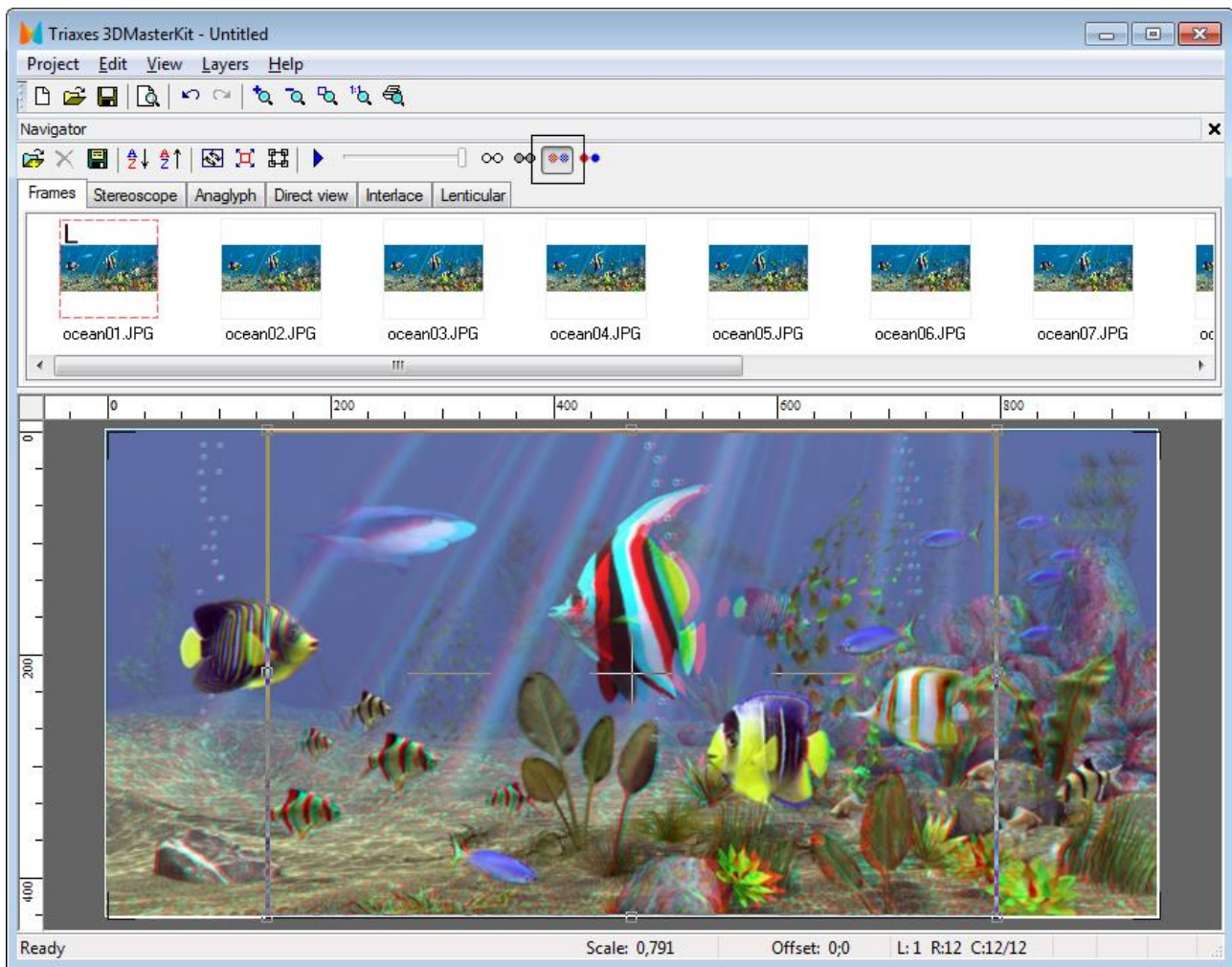
3.3.3 Frames series view modes

Fig. 3.5. Anaglyph view mode

To simplify the images matching, there are several view modes available in the **Frames** tab. You can select one of the four view modes from a drop-down list - normal and anaglyph of three types: monochrome, quasi-colored, and colored. The anaglyph mode is used to view a stereo effect at a stage when you match images, which might be quite helpful sometimes.

When viewing such image through anaglyph glasses (with red and cyan glasses), you can observe stereo effect.

3.3.4 Zooming images in and out

Zoom in:

Menu command: **View >> Zoom In**.

Hot keys: **+** ("plus" on the keypad))

Toolbar button:

Zoom out:

Menu command: **View >> Zoom Out.**

Hot keys: - (minus on the keypad)

Toolbar button:

Fit to the screen:
Menu command: **View >> Fit on Screen**

Hot keys: **Ctrl+0**

Toolbar button:

This command zooms images so that they completely fit to the program window.

Actual size (in pixels):
Menu command: **View >> Actual size**

Hot keys: **Ctrl+Alt+0**

Toolbar button:

This command zooms the image as 1:1, i.e. one pixel of the image corresponds to

one pixel of the display.

Print size:
Menu command: **View >> Print Size**

Hot keys: **Ctrl+Alt+P**

This command zooms the image so that its size on the screen is the same as when it is printed.

Zooming in and out with a mouse:
You can also zoom images in and out by mouse scrolling.

3.3.5   Animation view
Sequence of frames can be «played» using **Animation** button on the toolbar, or **View >> Animation** menu command.
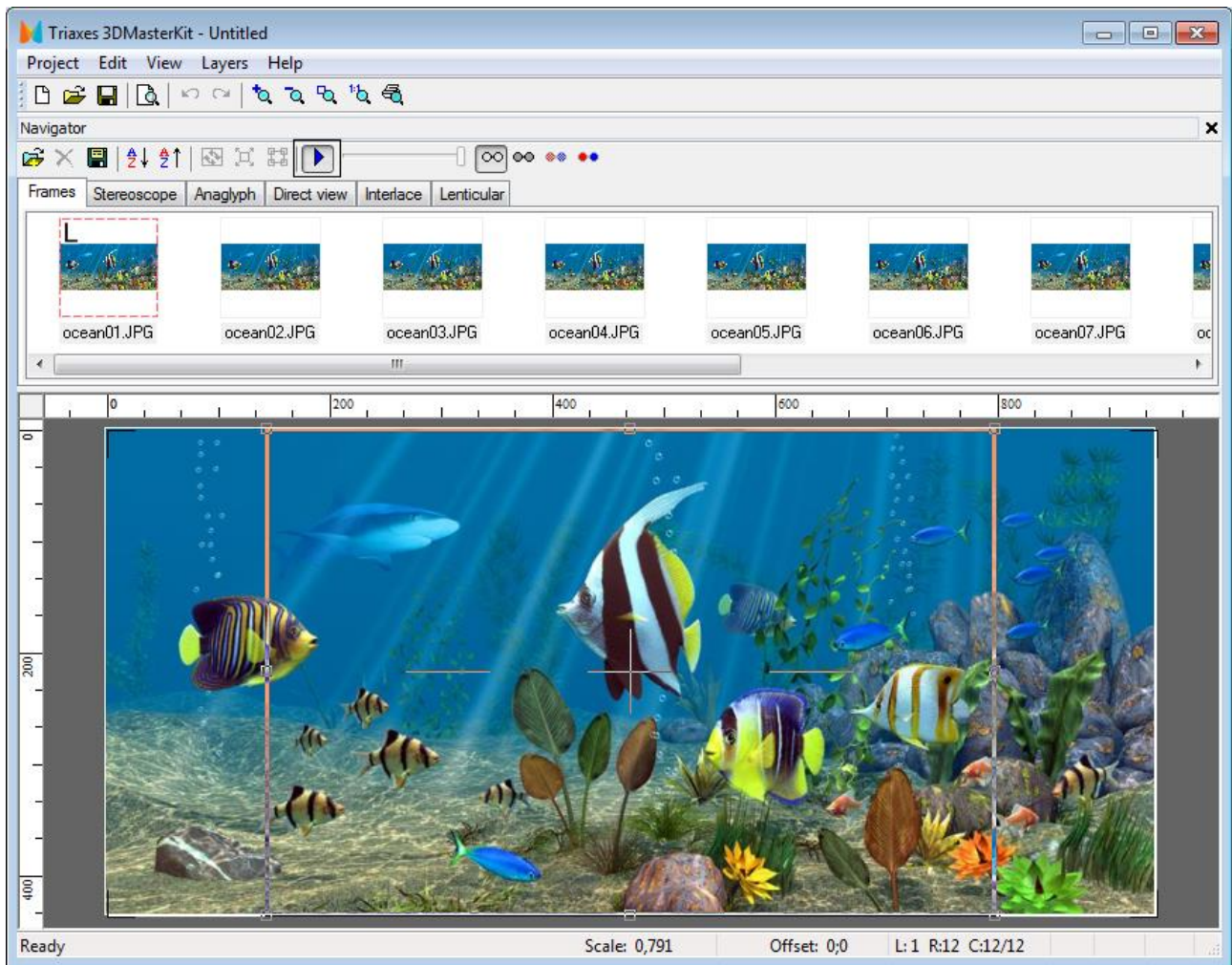
Fig. 3.6 Animation view

The playing speed is changed in **Settings** dialog by **Project >> Settings** menu command.
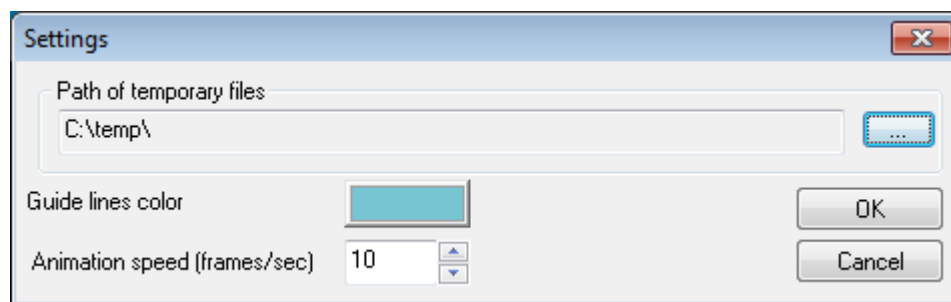

Fig.3.7 **Settings** dialog

3.4   Marking and correcting images

3.4.1   Marking images

The marking lies in setting two images from a series as the *Left* and the *Right frames*. The *Left* and the *Right frames* set the boarders of the frames sequence, which participates in stereo image generation. In order to set an image as the *Left frame*, it is necessary to click the right mouse button on a necessary image and then select **Set left** in the list of the appeared context menu. The same with setting a frame as the *Right* one.

When you create anaglyph stereo images, cards for the stereoscope, cards for parallel or cross-eyed viewing methods, in generation will participate only two frames, set as the *Left* and the *Right* ones.

When you create lenticular images, all frames between the *Left* and the *Right* one will participate in generation. Remaining frames, which are more to the left from the frame set as the *Left* and more to the right from the *Right* one, will be marked by the black-white color and won't participate in generation.

There is also a concept of the *Active image*.

The *Active image* in 3DMasterKit is an image selected at the moment. In order to select an image, i.e. make them *Active*, it is necessary just click the left mouse button on its thumbnail.

An image set as the *Active* one, is marked by a blue frame and always shown superimposed over the *Left frame* with the specified by the slider transparency in the working area of the software.

It is necessary for vertical and horizontal alignment of a frames series and also for zero parallax plane setting.

3.4.2   Image motion

The right image of a stereo pair is always displayed above the left one. To specify a zero parallax object, correct the position of the right image relative to the left one.

Any image can be moved relative to the canvas. The image motion operation is applied to the *Active image*, towards the current (selected) object. To mark an image you should click on it in the list of thumb-nail images.

To move an image, direct the mouse pointer at the object, you are matching towards. Then click the left or right mouse button, which will correspond to one of two moving modes. After that hold down the mouse key and move the mouse pointer to the desired position.

The process of moving the image will be finished at the point where the mouse button will be released.

The modes of moving differ in the following way: if you hold down the right mouse button, a line is drawn from the initial point to the current position of the pointer, but if you hold down the left mouse button, the image moves together with the pointer.
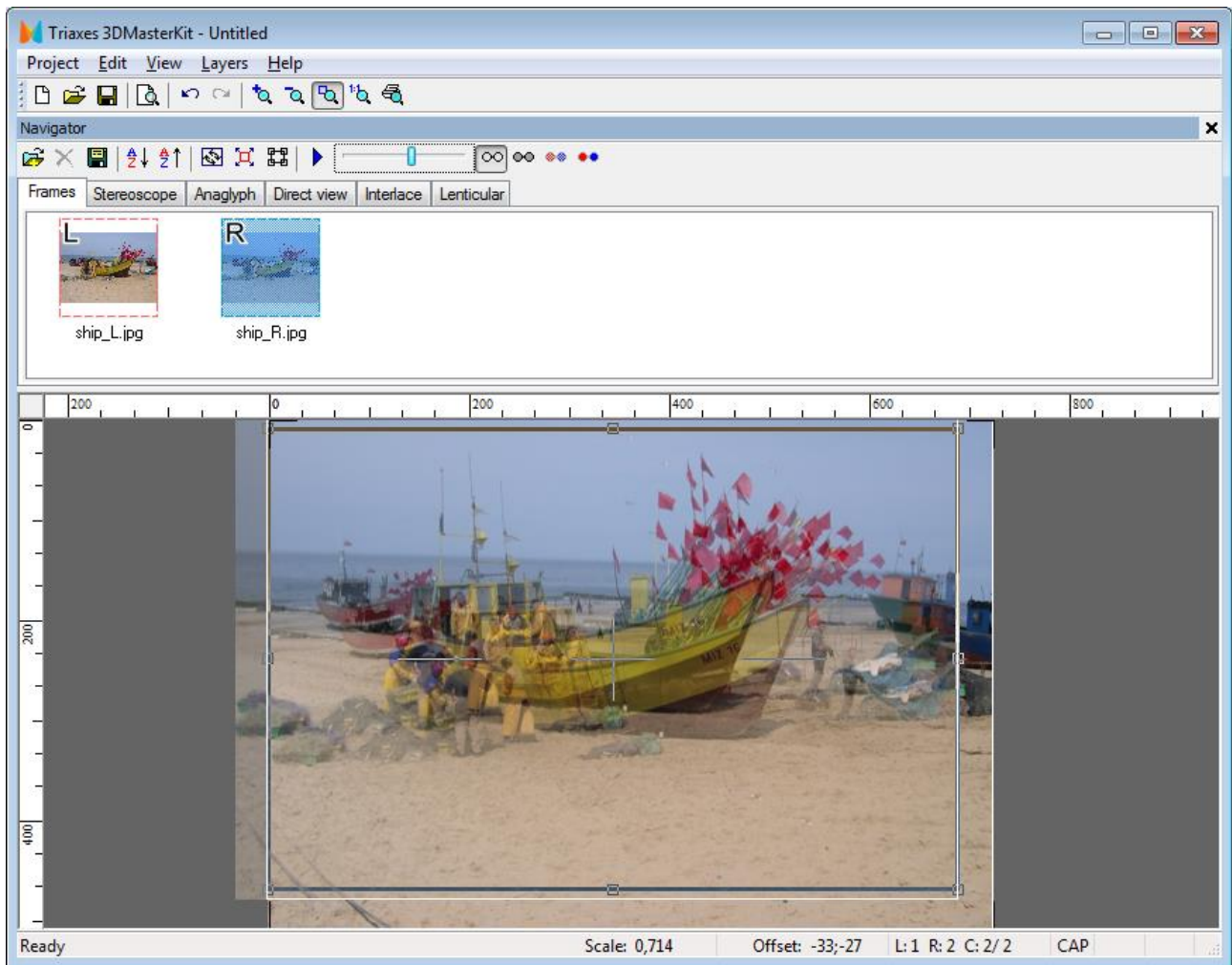
Fig. 3.8. Image motion

Useful tip: If during an operation with one of the mouse buttons being held down, you click the second mouse button, the operation is canceled. This rule also applies to other operations: scaling and rotating.

If you create a lenticular stereo image out of a sequence of frames taken with a parallel method, setting of a zero parallax object must be done <u>for all images in the sequence.</u>

Besides, it is very convenient to align images using keyboard buttons without mouse – switching between frames with **Ctrl + left/right arrow** buttons.

3.4.3   Automove

Menu command: Edit >> Automove

The automove operation is used when preparation of a stereo sequence for lenticular encoding takes place.

In order to use the Automove command, it is necessary to set the leftmost image as the *Left frame* and the rightmost – as the *Right* one. After that, perform vertical alignment and combine them by a zero parallax object. Then select the Edit >> Automove menu command.

As the result, all the in-between frames will be automatically combined by the principle of proportionality. After that, it is necessary to select in turn all the rest frames (make them *Active*) and perform the final zero parallax point correction. Then proceed to encoding.

3.4.4   Rotating images

Sometimes in course of stereo photography, especially manual, you can fail to keep the cameras parallel to the horizon. This defect also depreciates stereo effect. You can compensate this defect by rotating images.

Menu command: **Edit >> Transform >> Rotate**

Hot keys: **Alt+R**

Toolbar button:

The rotation operation is applied to the *Active image*. To set an image as the *Active*, click the left mouse button on it.

In the rotation mode, the mouse pointer has additional arrows indicating rotation .

To rotate an image, press the left mouse button, move the mouse pointer to the new position and release the button. The image will be rotated and the initial point will be moved to the final rotation point.

The image is rotated around the center of the crop frame. The initial and final rotation points are joined by arc. The rotation angle is displayed next to the rotation center as two numbers: the angle before the operation + the current rotation angle.

Fig. 3.9. Initial image rotation

In the rotation mode you can change the size and the position of the crop frame and thus set the rotation center to the position you need.

If you click the right mouse button during rotation (when the left mouse button is pressed), the current operation will be canceled.

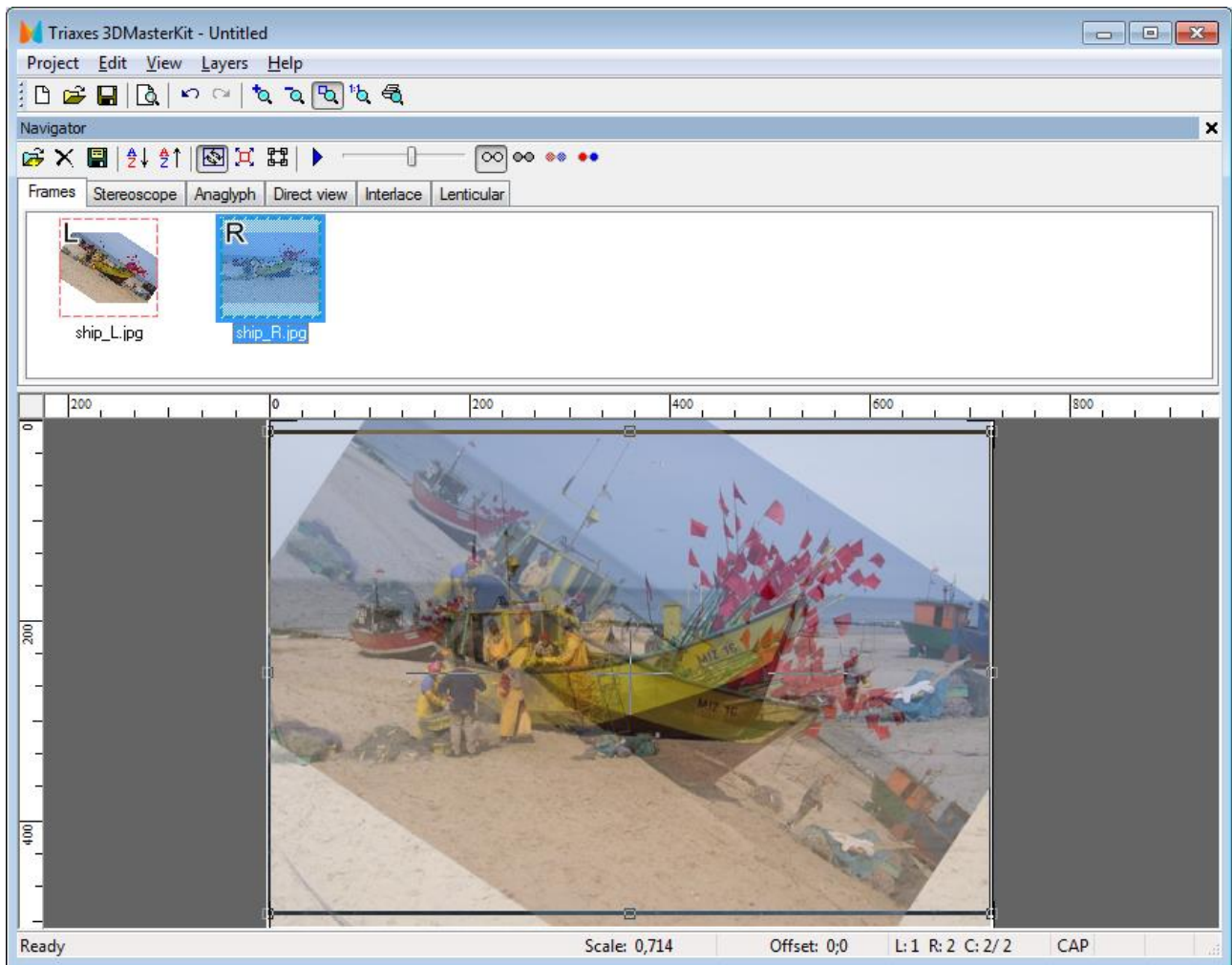To exit the rotation mode, just click the right mouse button or press **Esc**.

Fig. 3.10. Rotation result

Here is a practical example of correcting an image. In the picture, you can see that there was a slight defect when the stereo pair was taken: horizon lines are not parallel.

Fig. 3.11. The example of the image correction (initial state)

Correct the right frame first. Set the Opacity slider to the rightmost position. Change the size of the crop frame so that the crosshair is on the horizon line of the image. Enable the rotation mode for the right frame. Point the mouse pointer to the horizon line and move it so that it matches to the horizontal line of the crosshair.
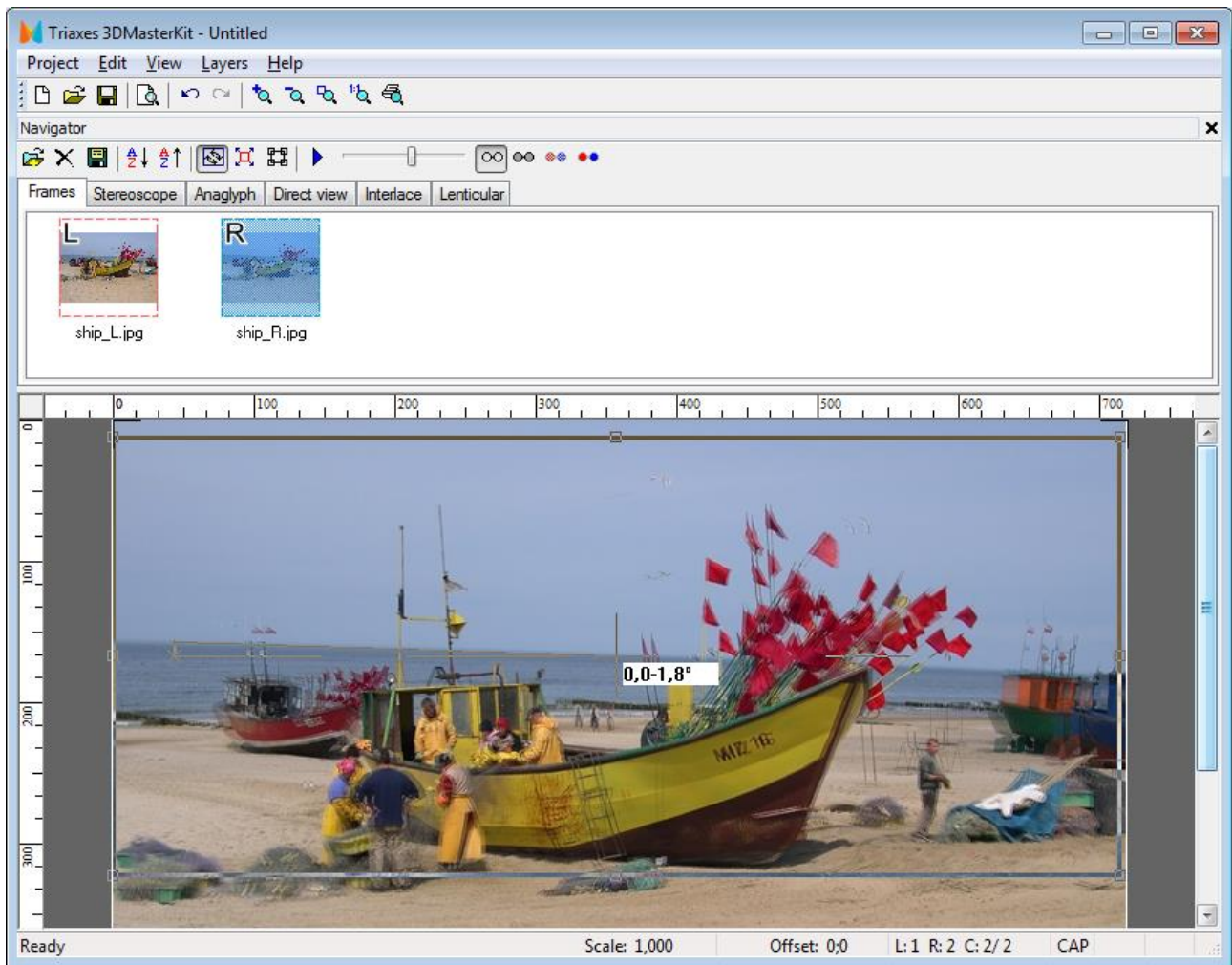
Fig. 3.12. Adjusting the horizon line

Do the same for the left frame. Then you should only specify the zero parallax object and crop the image.

Rotate precise mode

The **Edit >> Transform >> Rotate Precise** menu command is used for the exact angle rotation of an image.

Hot keys: **Ctrl+Alt+R**

The command opens a dialog allowing you to specify the exact rotation angle.
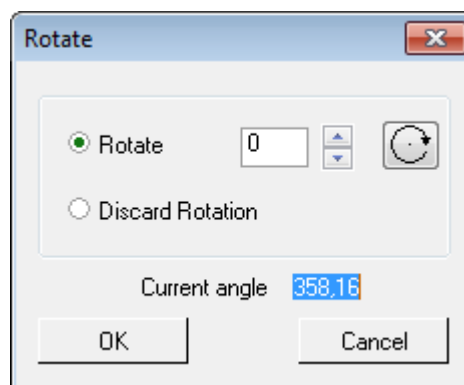
Fig. 3.13. Rotate precise dialog

You should specify the rotation angle in the **Rotate** field. You can specify the angle either manually or using the "scrolling" buttons with arrows. You can specify the direction of rotation using the button located near the field. A click on this button changes the direction of rotation to the opposite one.

You can undo all previous rotations by marking the **Discard Rotation** option. Click OK to apply rotation or Cancel to close the dialog without applying the changes.

3.4.5 Scaling images

Menu command: Edit>>Transform>>Scale

Hot keys: Alt+S

Toolbar button:

The scaling operation allows you to correct inaccuracies in the scale of source frames caused by automatic focus in cameras. If the scale of objects represented on a series of frames differs, you can take the scale of the left frame as a basis to adjust the sizes of objects on all frames by it.

Useful tip: Scaling can also be used to create a lenticular image with the zoom effect. To do it, add a sequence consisting of copies of the same image to the list of frames, set gradually increasing scale for this sequence and align frames by the selected object.

In the scaling mode, the mouse pointer changes its form: squares of different sizes that appear next to the arrow , and black marching ants that appear around the currently selected image. To scale the image, press the left mouse button on the screen, move the mouse pointer to the new position and release the button. Scaling is always done relative to the initial size of the image. The scaling percentage is shown near the center of the window.

Scale precise dialog

The **Edit >> Transform >> Scale Precise** command in the menu is used to scale images precisely.

Hot keys: **Ctrl+Alt+S**

The command opens a dialog allowing you to specify the necessary scale.
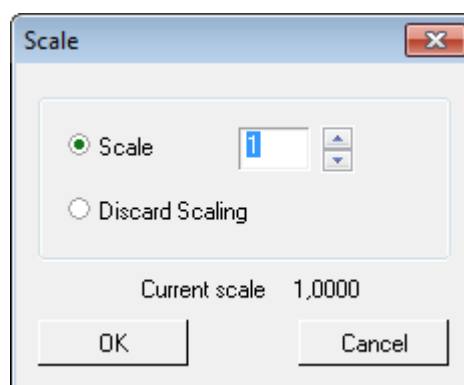

Fig. 3.14. **Scaling** dialog

The scale value is entered in the **Scale** field.

You can undo all scale changes by marking the **Discard Scaling** option.

Click **OK** to apply the new scale to the current image or **Cancel** to close the dialog without applying the changes.

3.4.6   Correcting a Histogram

Menu command: Edit >> Transform >> Histogram

Hot keys: Ctrl+Alt+H

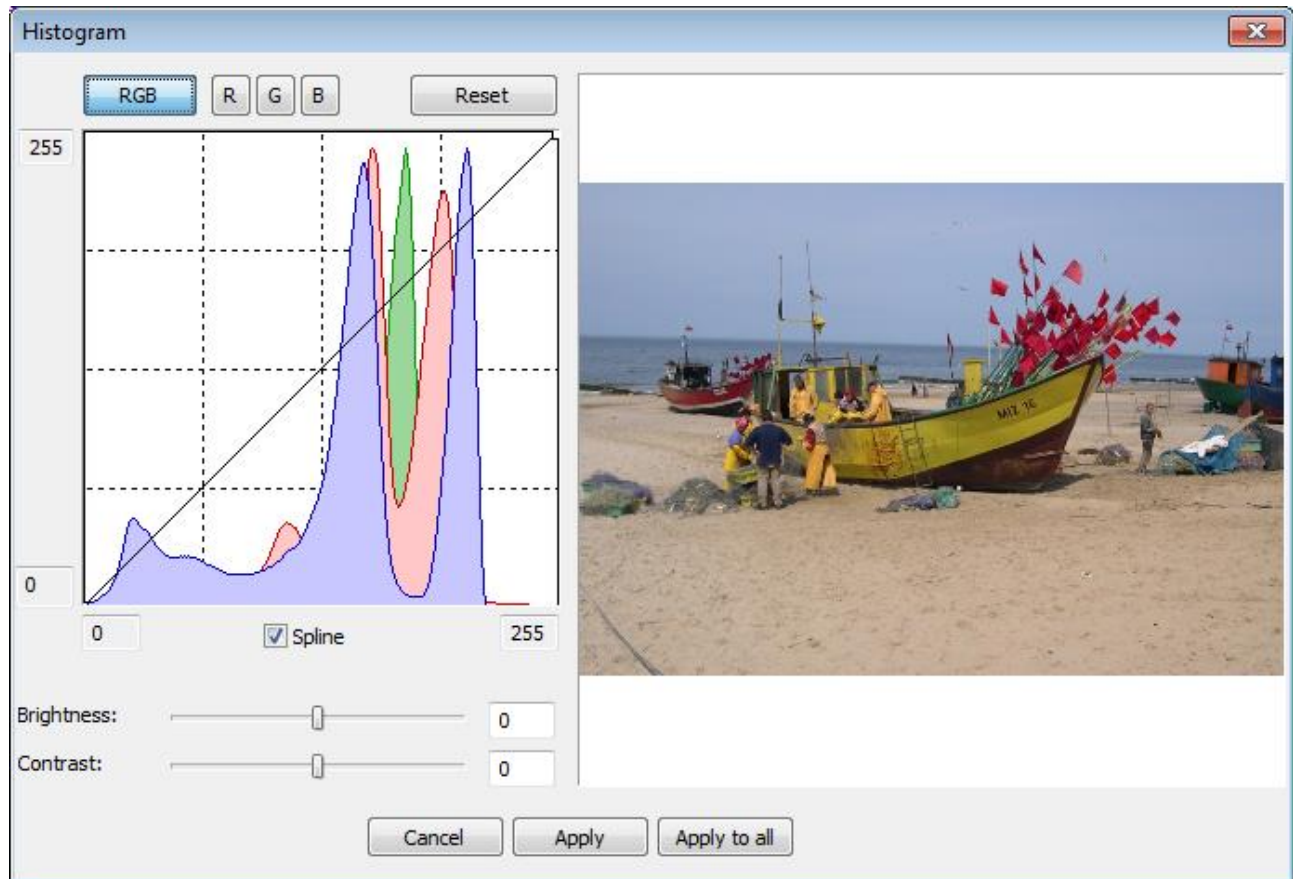The command opens a dialog allowing you to edit histogram settings for every image.

Fig. 3.15. Histogram correction dialog

Histogram (in photography) — is a graph of the semi-tones allocation that has two axes: the x axis represents the brightness, and the y axis represents the relative number of pixels with corresponding brightness values.

By histogram you can find out the main idea of exposition correctness, image contrast and color depth, and also define the required correction when you take a photo (changing exposition and color balance, light or image composition) and also when processing is started.

Use the buttons above the histogram to correct it by separate color channels: RGB – all channels, R – red channel, G – green channel, B – blue channel. By clicking Reset you can go back to source histogram.

Set the control point by a left mouse button clicking. Remove the control point by a right-mouse button clicking. Move the control point by left-mouse clicking on graph and holding the point while you're moving it to the necessary place.

There are two ways to connect controlling points: the spline and the broken line. Use Spline flag under the histogram to enable/disable spline mode. Fields by the x and the y

axes allow correcting manually the brightness of borders. Besides, they can be moved by left mouse button clicking on the required border.

Below the histogram there are **Brightness** and **Contrast** sliders to set brightness and image contrast.

With the help of the histogram one can noticeably increase the image quality. The below histogram does not have optimal distribution. For optimal correction move the right border nearer to the histogram:
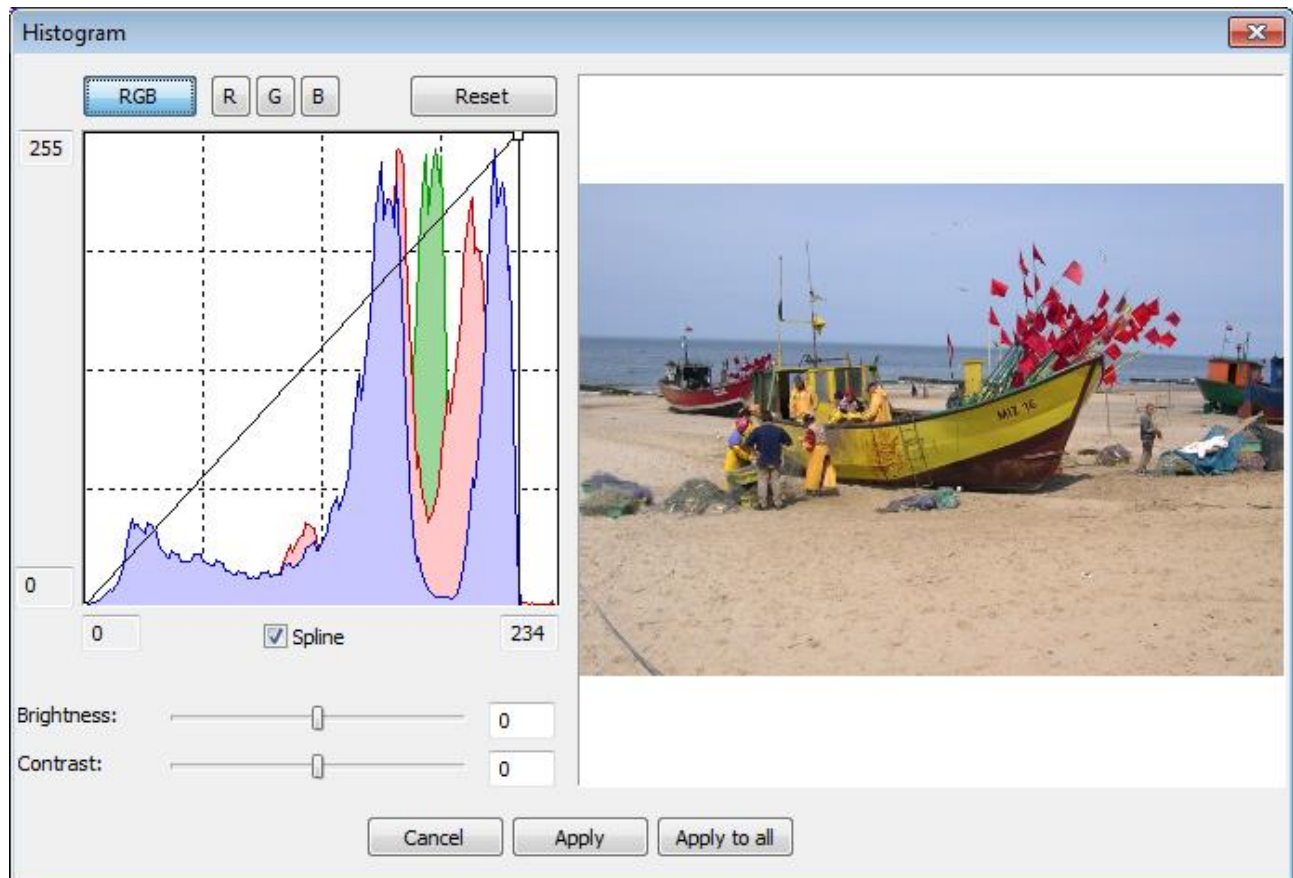

Fig. 3.16. Histogram correction dialog (continuation)

The above image contains too much of red color. It is easy to correct it. Toggle into the red channel (**R**), put a point on the histogram and move it a little.
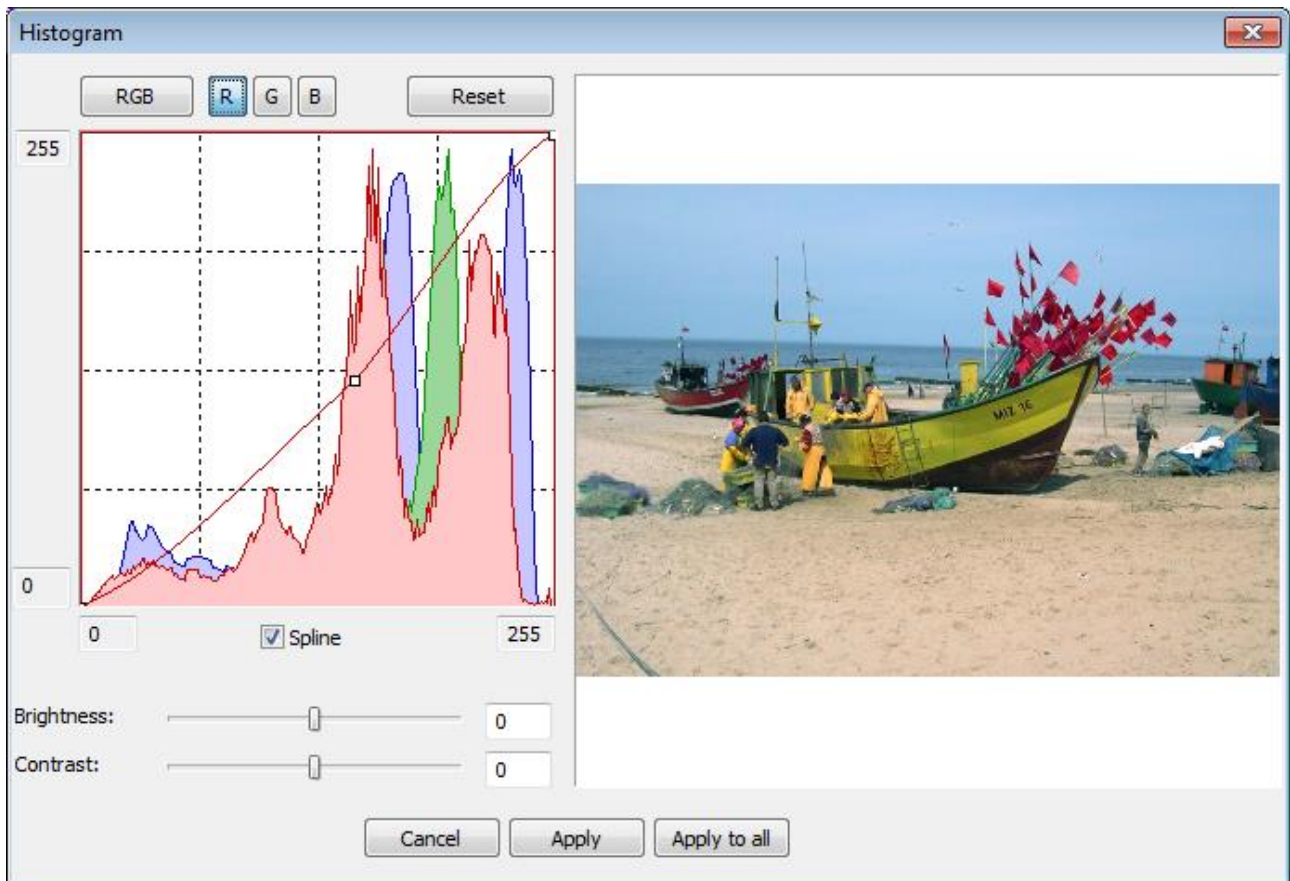
Fig. 3.17. Histogram correction dialog (completion)

By clicking **Apply to all** button, the histogram correction is applied to all frames.

3.5   Canvas and images cropping

3.5.1   Canvas

The conception of canvas in 3DMasterKit is similar to that in Photoshop. The canvas' size limits the work area of the crop frame.

The canvas size is in pixels and is automatically set when you open the first image (either with layers or an initial). When you open a file of the Photoshop .psd format, the canvas size in 3DMasterKit is set as equal to the canvas size saved in this file.

If necessary, you can change the canvas' size in the **Canvas settings** dialog.
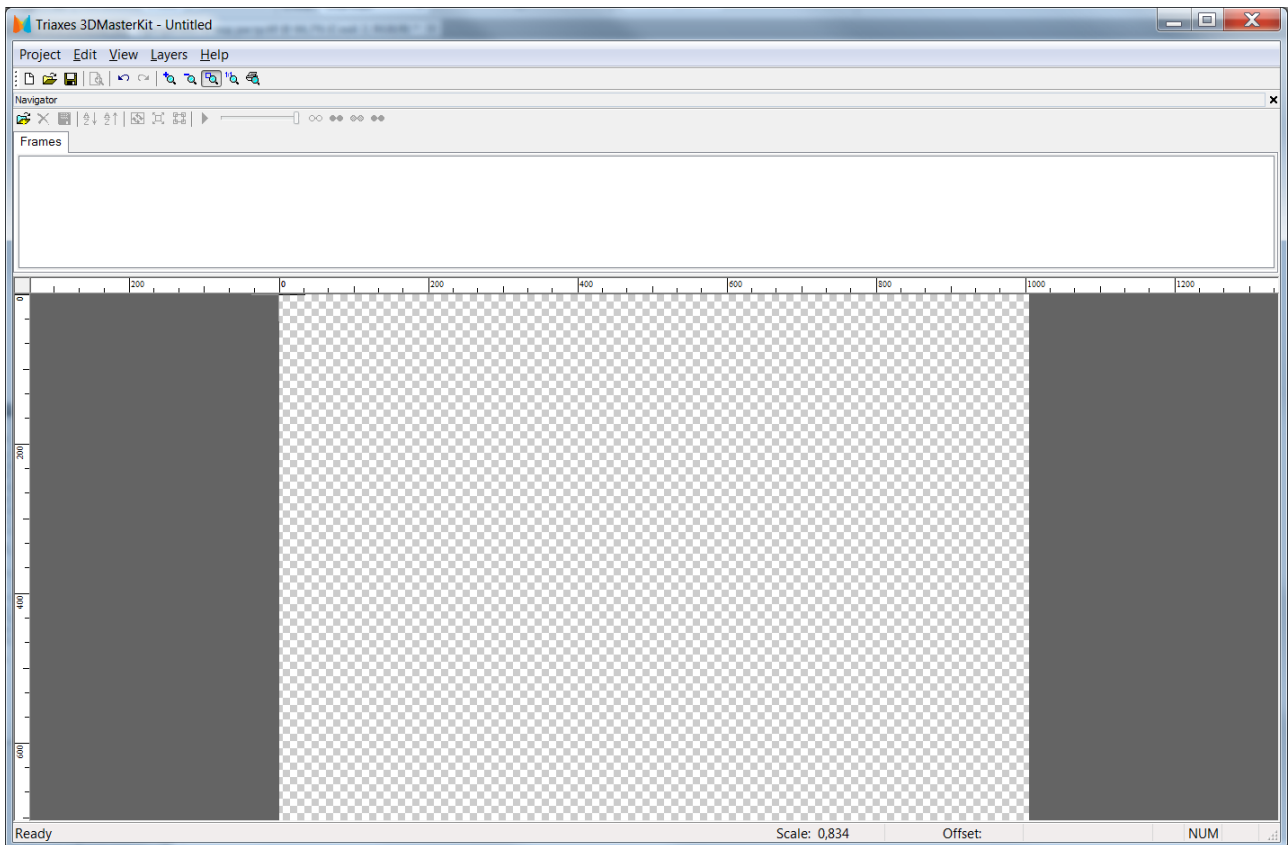
Fig. 3.18. The canvas

3.5.2   Canvas settings dialog

The dialog of the crop rectangle parameters settings Canvas settings dialog is used to change the canvas size.

The canvas size is set in pixels.

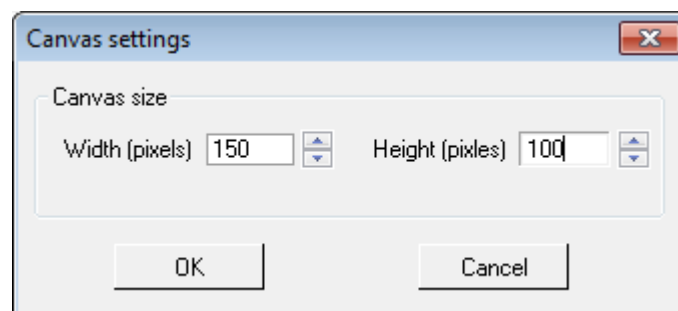Menu command: **Edit >> Canvas settings**

Hot keys: **Ctrl+Q**

Fig. 3.19. **Canvas settings** dialog

3.5.3   Crop rectangle

A crop rectangle is an interface element of 3DmasterKit that is used to select those parts of frames that will be used to create an encoded image. The crop rectangle is colored in an inverse color. The crop rectangle is always on the screen if the Frames tab is open. A crosshair marks the center of the crop rectangle.
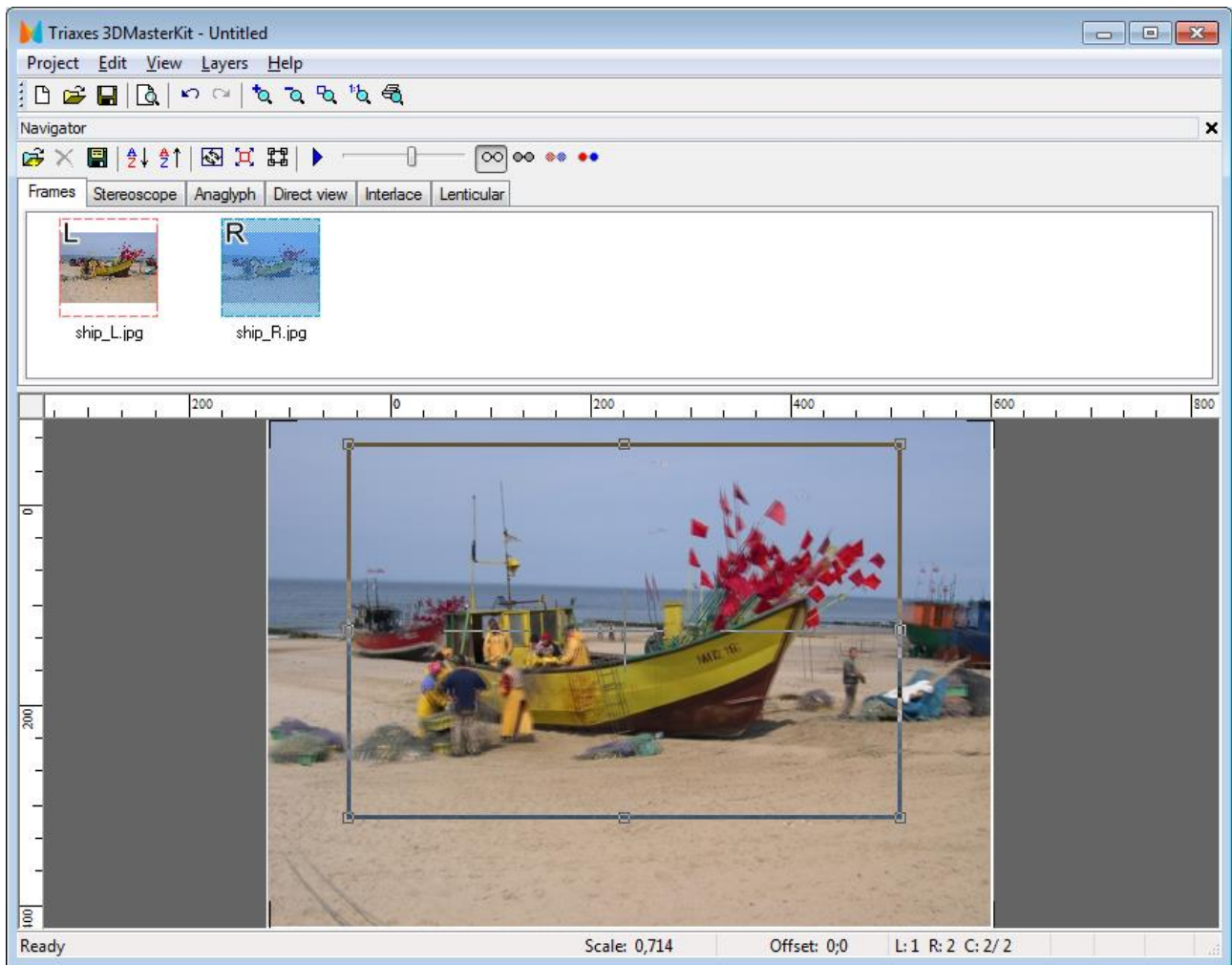
Fig. 3.20. Crop rectangle

There are active areas at the corners of the frame (shown as small squares) and you can use them to change the size and aspect ratio of the frame. To change the size of the crop rectangle, move the mouse pointer over the active zone, press the left mouse button, drag the pointer to the new position and release the button. You can move whole crop rectangle to a new position by capturing any side of it with the mouse. The crop rectangle is always located in the area of the frames' overlapping. The area of the frames' overlapping is marked with a rectangle drawn with a thin white line.

3.5.4   Crop Rect Settings dialog

The Crop Rect Settings dialog is used to control the properties of the crop rectangle.

Menu command: **Edit>>Crop Rect Settings**

Hot keys: **Ctrl+F**

Toolbar button:

Besides, you can open this dialog by clicking the right mouse button at any side of the crop rectangle.
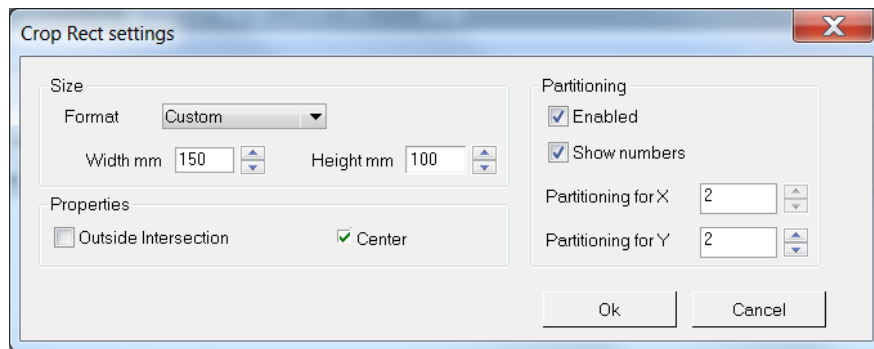
Fig. 3.21. Crop Rect Settings dialog

It is often necessary to specify the aspect ratio of the crop rectangle corresponding to the planned size of the stereo image. For example, it can be the size of the lenticular screen equal to 100x150 mm. To make the encoded image corresponding to this size, specify the necessary **Aspect Ratio** for the crop rectangle. Use the **Width** and **Height** fields to specify the aspect ratio. In order to avoid accidental changes in the aspect ratio of the crop rectangle in the process of image correcting and cropping , select the **Lock Aspect Ratio** checkbox.

The **Center** parameter enables the automatic mode for selecting the size and position of the crop rectangle. In this mode, the size of the crop rectangle is set to the maximum possible value taking into account the specified aspect ratio and it is located in the center of the images' overlapping. When you change the relative position of frames, the area of their overlapping may get smaller. The crop rectangle automatically monitors all changes and corrects its position.

When you change the size or position of the crop rectangle manually, the **Center** mode is disabled.

3DMasterKit Professional edition allows to split an image into parts. It may be useful if it's necessary to make a large format image.

The parameters of image splitting can be set in the Crop rectangle dialog (Fig. 3.21) and include:

- Partitioning on/off
- Enumeration on/off
- X axis partition – the number of parts horizontally
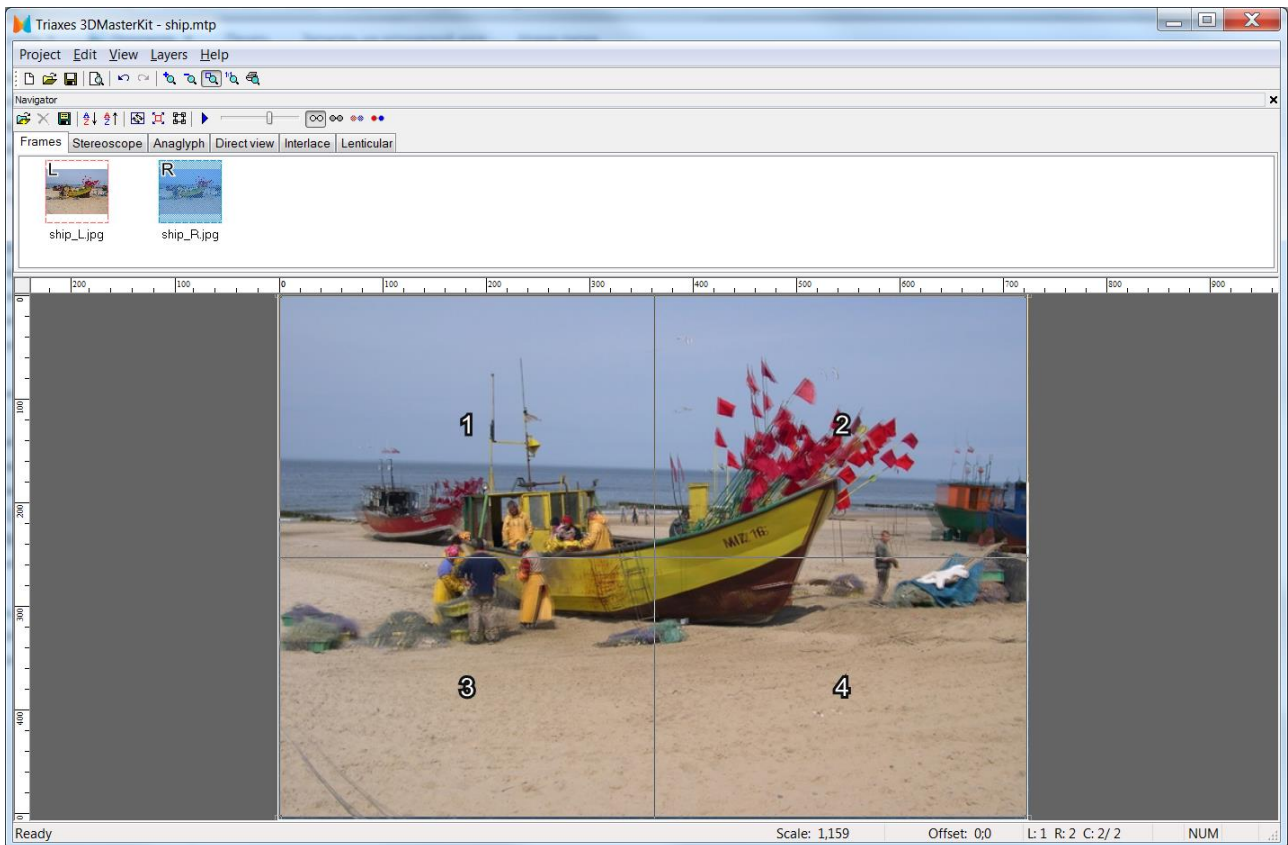- Y axis partition – the number of parts vertically

Fig. 3.22. Partitioning

After you have set the partitioning parameters you can go to the **Lenticular** tab, press **Generate** button and the **Part by part** generation Settings dialog.
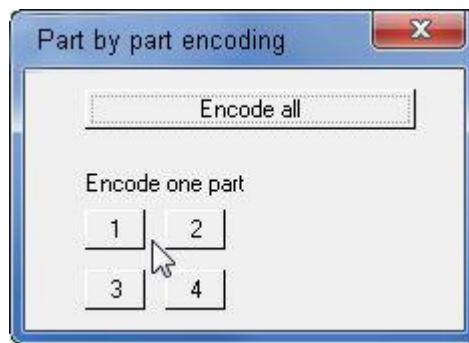

Fig. 3.24 Part by part generation

It is possible either to encode the whole image or to choose a certain part of it. When generating to file the **Encode all by parts** button allows to save all parts of the image at once. They will be saved in separate psd or bmp files on your hard drive.
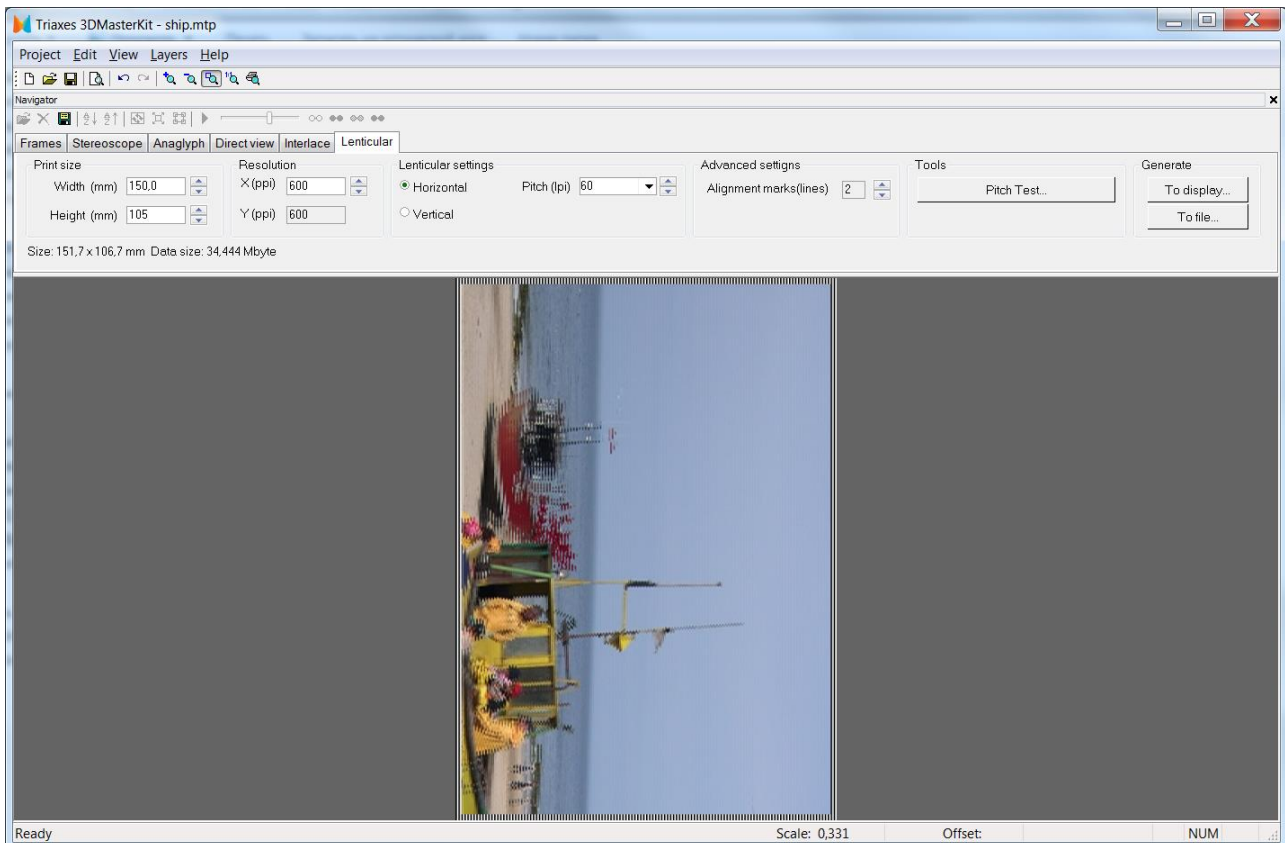
Fig. 3.25 Part by part generation on the screen

3.6 Printing images

3.6.1 Print Setup

Menu command: **Project >> Print Setup**

The command opens the standard Windows Print Setup dialog where you can select the printer, used on default, the size and orientation of paper.

3.6.2 Print Preview

Menu command: **Project>>Print Preview**

Toolbar button:

The **Print Preview** command switches the program to the print preview mode. You can see the position of an image on the print page in this mode. The **Print** button sends an image to the printer. The **Close** button exits preview mode. The **Print Setup** button opens standard **Print Setup** dialog.

In the **Print Preview** mode, you can:

- use the mouse or the keyboard to set the position of the image on the print page (the coordinates of the upper-left corner in mm: x, y);

- rotate the image 90° – select the **Horz/Vert** checkbox;

- ill the page with image copies (the **Fill** checkbox) and specify the interval between copies (the **Interval** field);

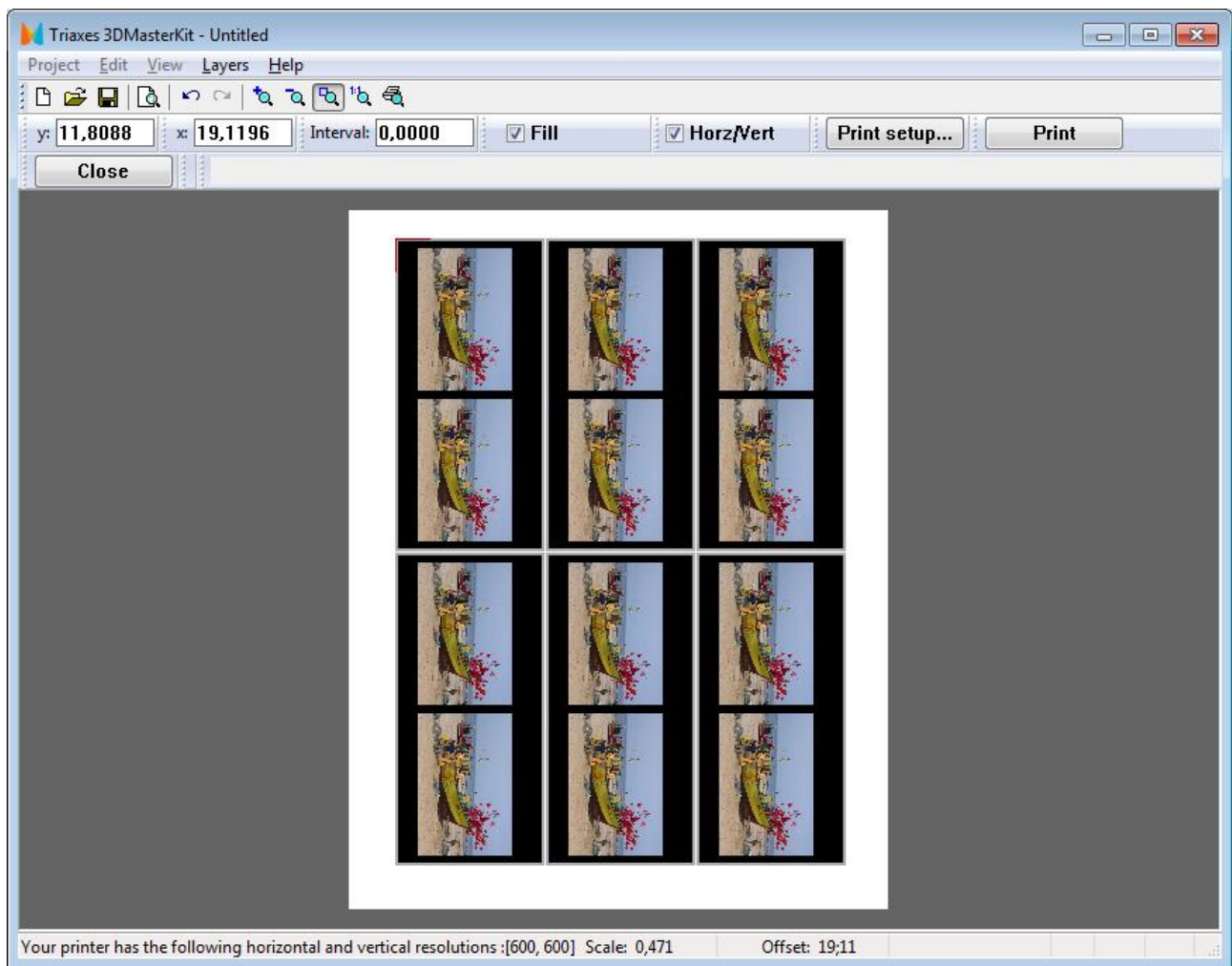- use mouse scrolling to zoom the image in and out.

Fig. 3.22. Print preview

Status line shows the current printer resolution in pdi (ppi) received directly from the printer driver.

4. EXAMPLES OF 3DMASTERKIT USE

4.1 Making a lenticular flip photo

4.1.1 Lenticular flip images and 3DMasterKit

Images which change depending on the viewing angle, are commonly referred to as lenticular flip. Lenticular flip images consist of two or more frames. In the simplest case, only two different frames are used. The encoding means "cutting" frames into thin stripes and mixing them in such a way that a pair of stripes is located under each lens: one from the first image and the other from the second one.

The flip effect is achieved due to changes in the viewing angle; movement causes lenses on the lenticular screen to single out one or the other source frames from the encoded image (Fig. 4.1).
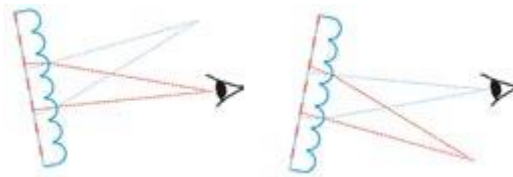

Fig. 4.1. The operation principle of the lenticular flip image
the first frame is red, the second one is turquoise)

We need two frames to work with.

Fig. 4.2. Source frames

Some slogan will be required. Using Photoshop we cut the inscription out from another photo and save it with transparent background into the separate file.

Fig. 4.3. The slogan for the card

We start by launching 3DMasterKit and load frames by selecting the **Project >> Add frames** command (hot keys: **Ctrl+Shift+O**)**.**

Then we select files with photos and move them to the right list in the **Open source images** dialog by clicking the button with an arrow to the right on it.
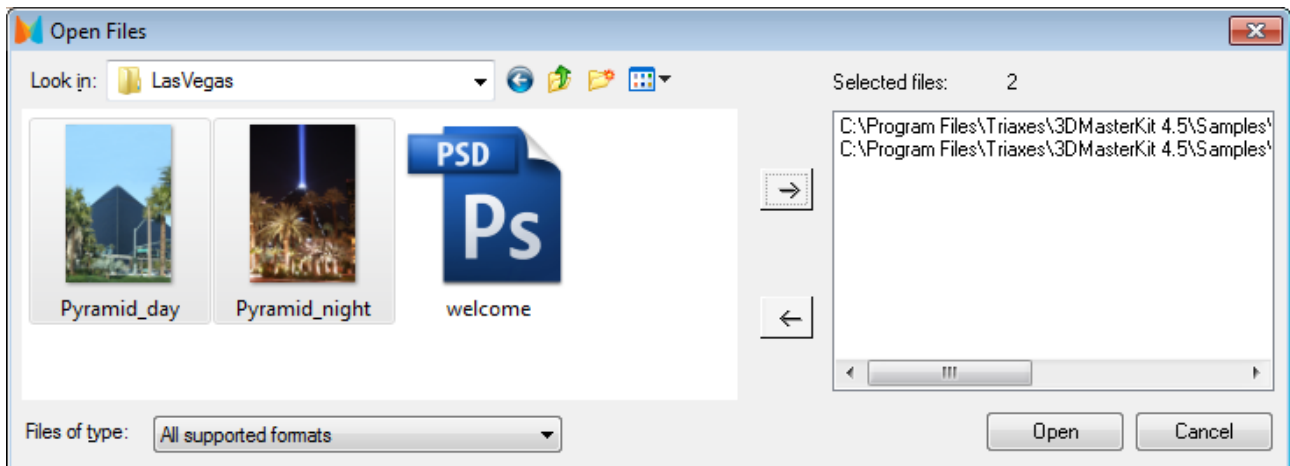

Fig. 4.4. **Open source images** dialog

After you click Open, the photos will be displayed in the list of frames at the upper part of the program window on the Frames tab of the Navigator window (Fig. 4.5).
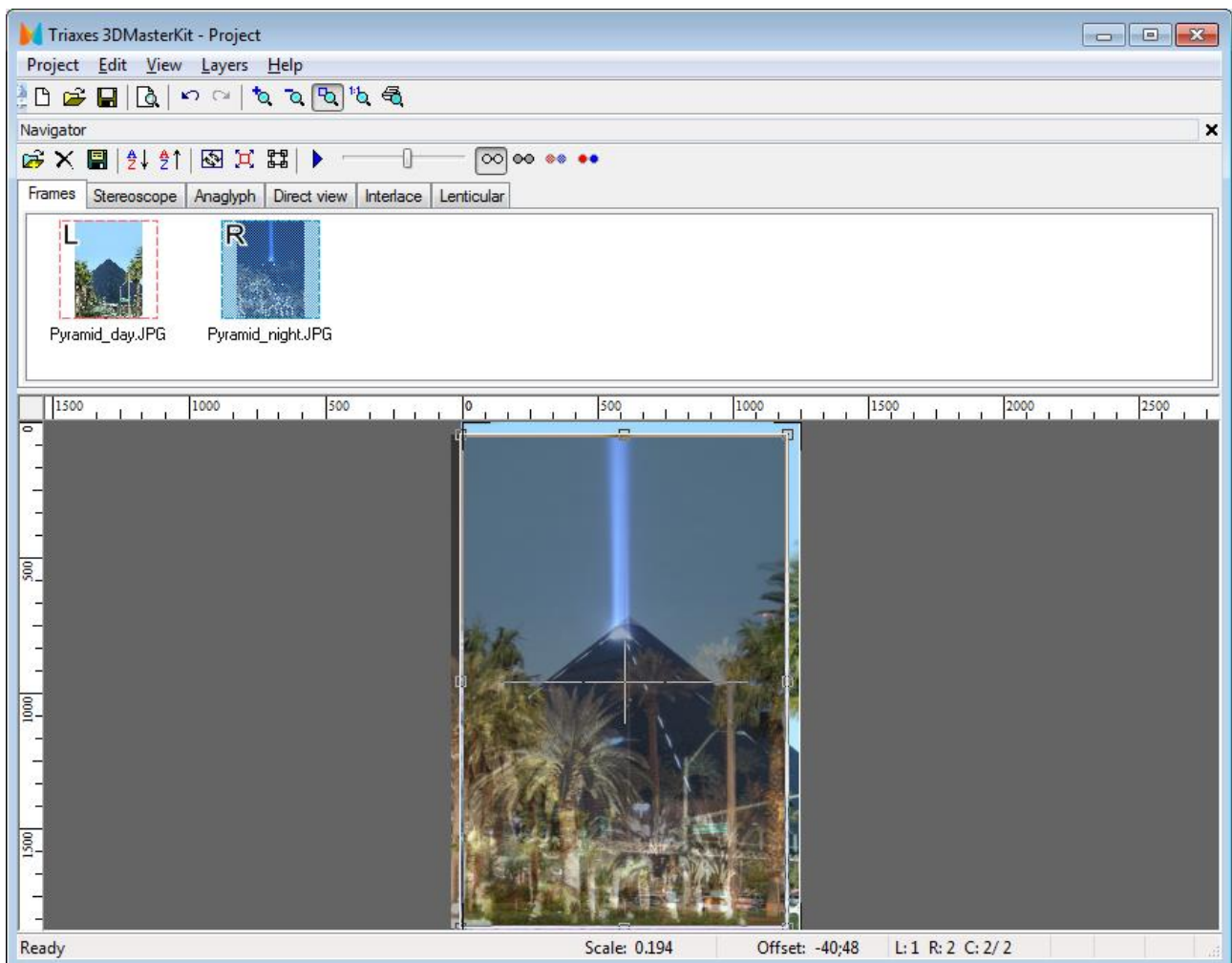

Fig. 4.5. Navigator window

The frames will be automatically set as the *Left* and the *Right* ones and marked with the red and the blue dashed rectangles correspondingly. Both frames will be shown in the main window of the program. The *Right frame* will be automatically made *Active* and

superimposed over the *Left* one with transparency. That showing method is for comfortable setting relative position of frames on a ready flip image.

You can move the image with the left mouse button by dragging it to the place where you need it to be (fig. 4.6). You can position the image precisely using arrow keys on the keyboard (left, right, up and down).

Note: To select the image you want to edit , click on it in the list of frames.

Fig. 4.6 Image movement

A photographer held the camera in his hands while taking photos and one of the frames turned out to be a bit askew. We can see this situation at the Pyramid day image. 3DMasterKit allows the situation to be corrected. Execute the **Edit>>Rotate** command and use your mouse to specify the necessary rotation angle (fig. 4.7).
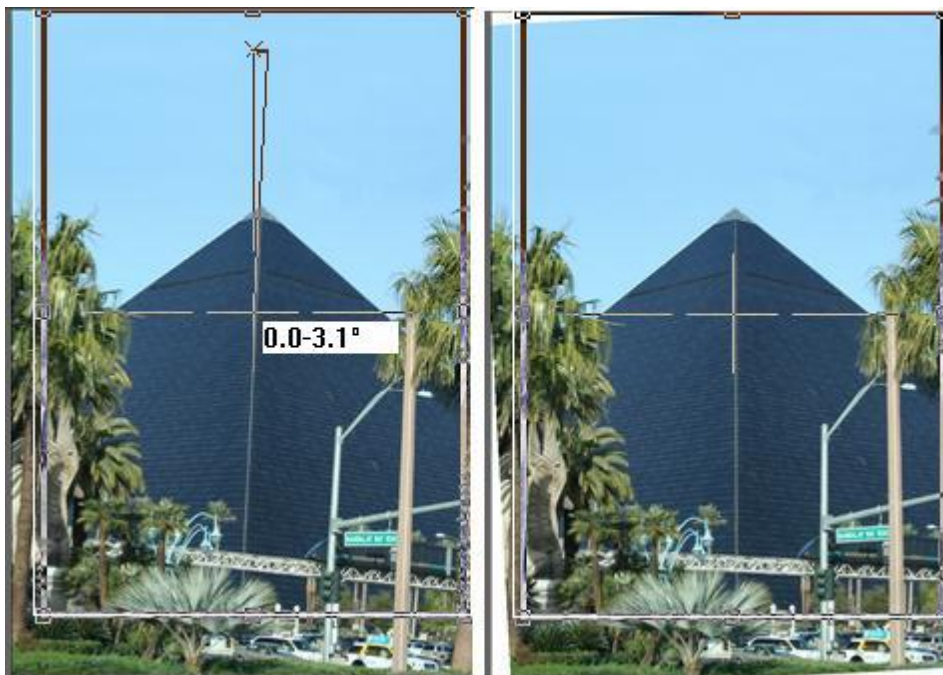

Fig. 4.7. Frame Rotation

3DMasterKit can also scale images (menu command **Edit >> Transform >> Scale**), which allows you to match the size of objects if necessary.

The next step is to add the message into the picture.

Use command **Layers >> Add** and select the file with the text image.
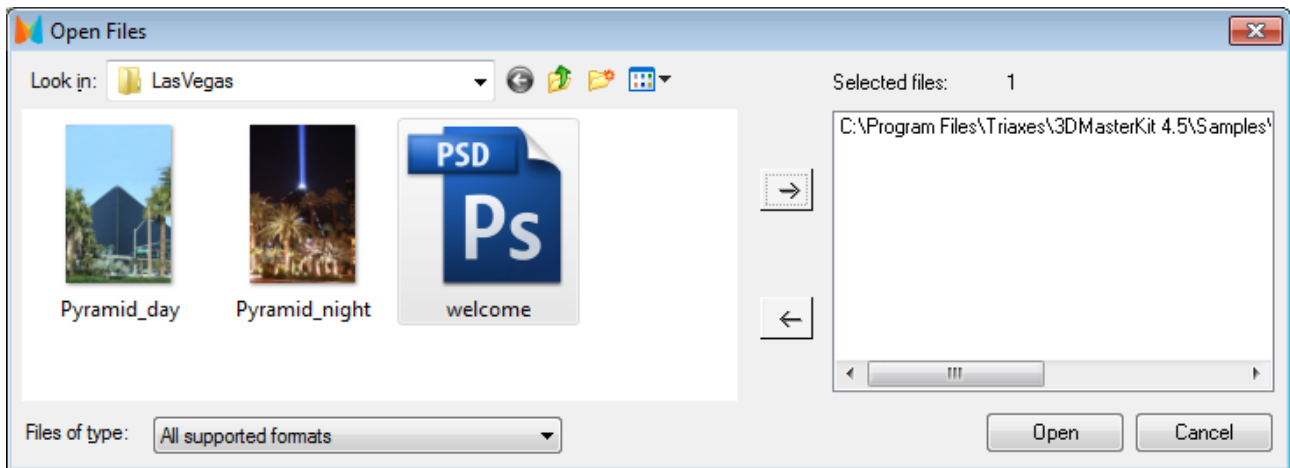

Fig. 4.8 Adding layer with the text image

After the transparent layer with the text is added to the project, adjust its size and position.
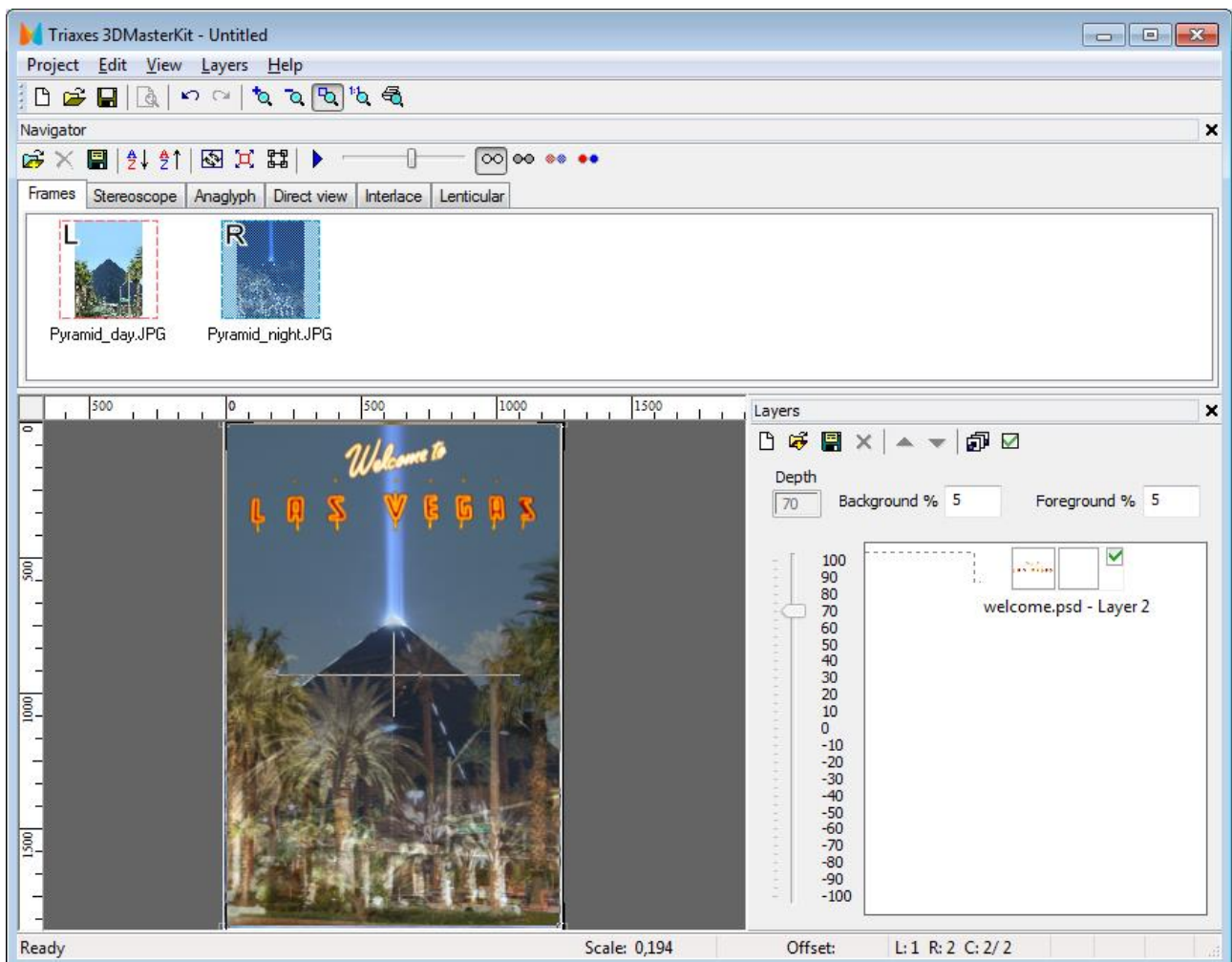

Fig. 4.9 The image with overlapped text

Then it's necessary to generate stereo frames from layers (**Alt+G**), but in the **Overlapping existing frame** mode (fig. 4.9a). In this case frames generated from layers don't replace the existing frames, but overlap them.
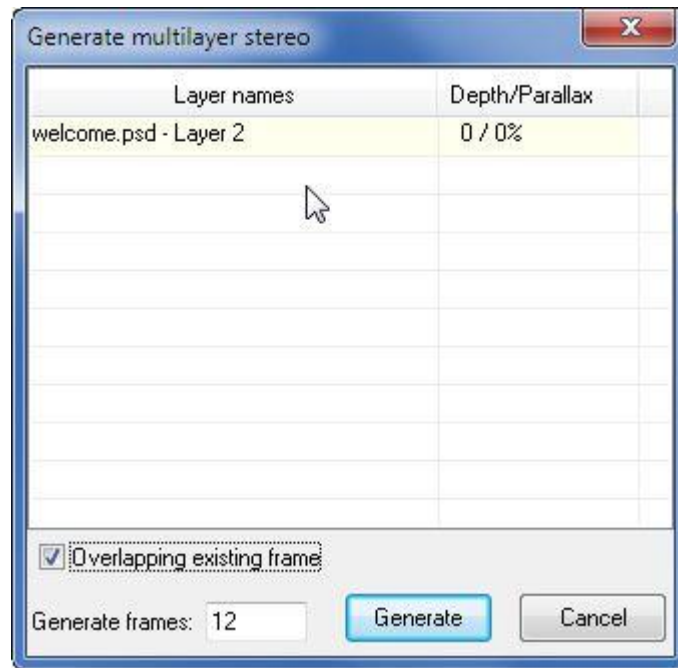
Fig. 4.9a Overlapping existing frames mode

The working area of 3DMasterKit always contains the **Crop Rectangle** control element (it looks like a rectangle with active areas in its corners). It automatically detects the area of images' overlapping allowing us to select the area of the source frames that will be present in the final photo. In other words, it shows the area that will be included in the final image. The frame can automatically keep the aspect ratio you need. Suppose we are going to prepare a photo with the size of 10x15 cm. Open the **Crop Rect Settings** dialog (**Edit >> Crop Rect Settings**), specify the image proportion you need and also select the **Lock Aspect Ratio** checkbox (fig. 4.10).
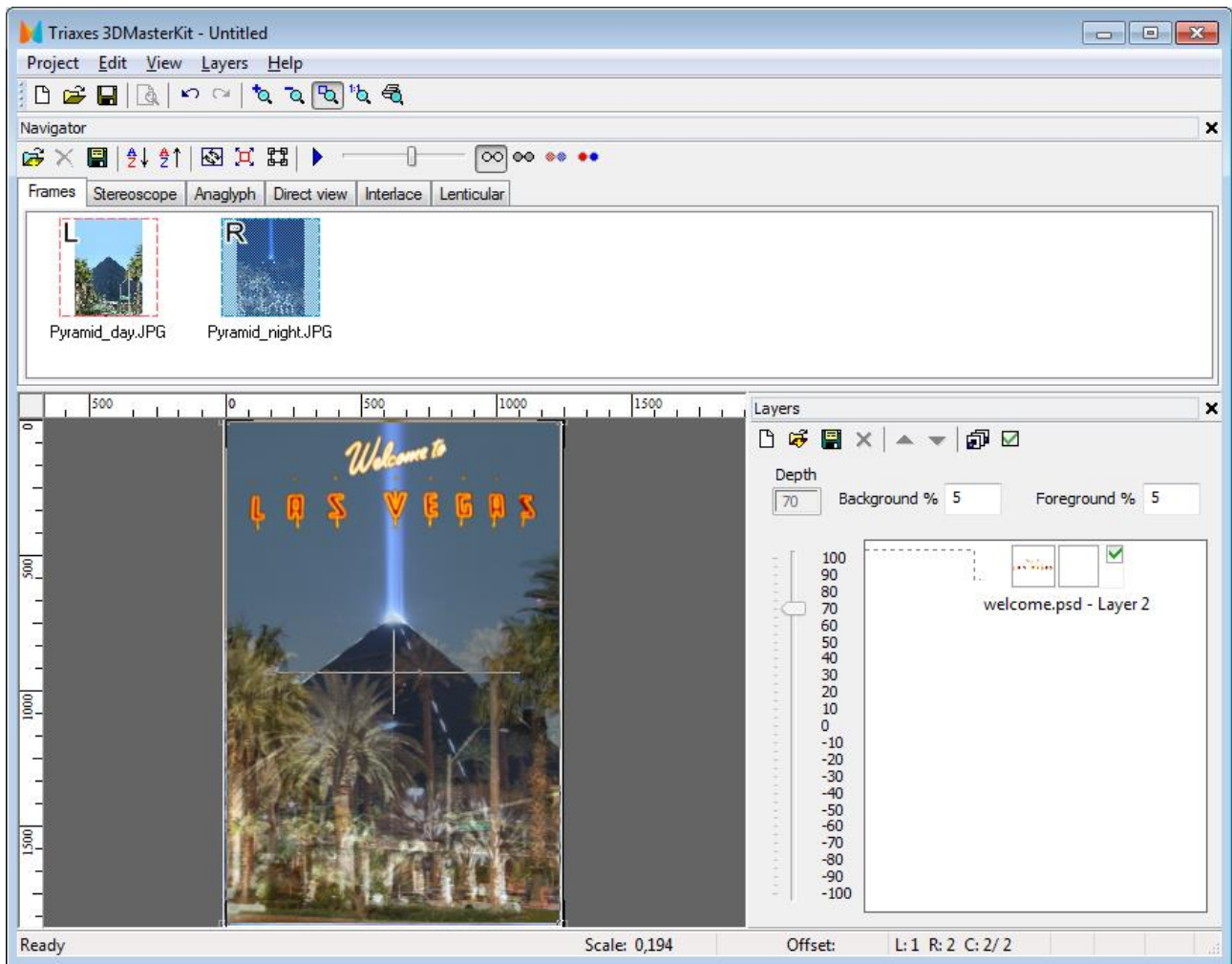
Fig. 4.10. Crop Rect settings

The active areas on the sides of the rectangle allow you to change its size keeping the aspect ratio. Use this tool to crop the image in order to remove the unneeded background.

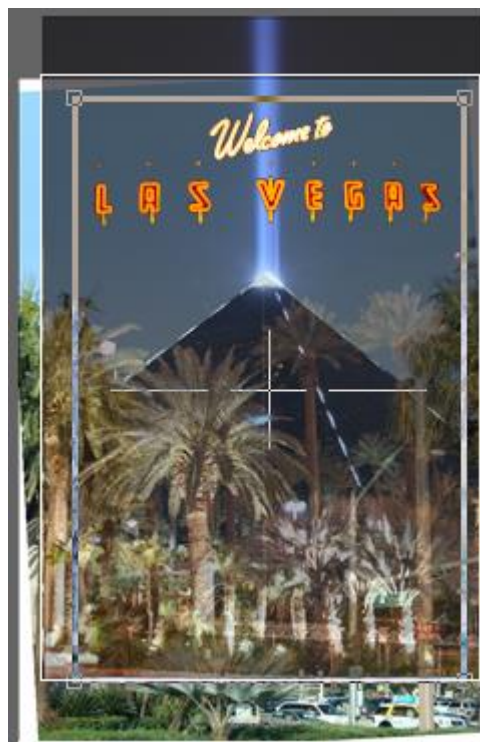As a result, the frame will look as shown in fig. 4.11.

Fig. 4.11. Cropping source images

Now you can start encoding the images. Open **Lenticular** tab of **Navigator** window. This tab shows control items that allow you to specify the size and resolution of the encoded image, lens orientation (horizontally or vertically), lens pitch (encoding pitch) and generation method. To create a lenticular image, select the horizontal lens orientation (fig. 4.12). In the same dialog you can create a test allowing you to select precise encoding pitch for particular lenticular lens - Generate Pitch Test button (see section 2.10.2).
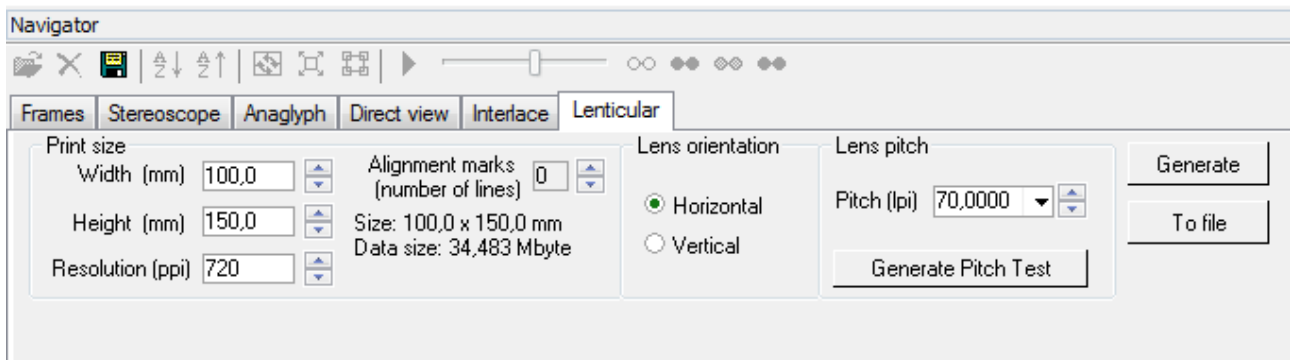

Fig. 4.12. Settings of the lenticular lens encoding

When all the necessary settings are done, click Generate and you will see the encoded lenticular image on the screen in a few seconds (fig. 4.13).
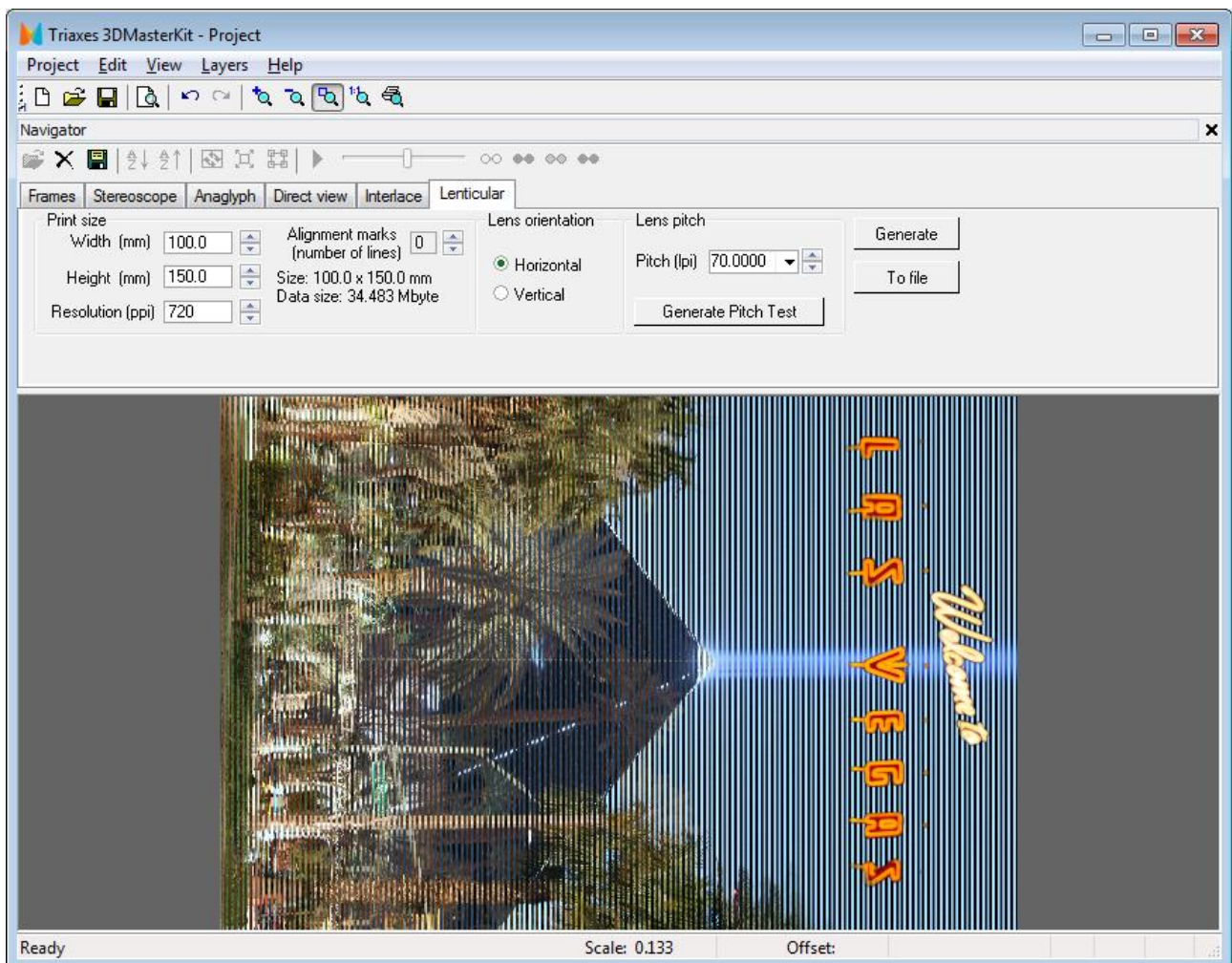

Fig. 4.13. Encoded lenticular photo

You can see the enlarged part of the encoded image in fig. 4.14.

Fig. 4.14. The enlarged part of an encoded image

Now, you only have to print the image and attach the lenticular screen. Select the **Project >> Print preview** command and **3DMasterKit** will show you the image in the position it will be located on the sheet of paper (fig. 4.15). Using the input fields or by dragging the image with the mouse, you can specify the necessary position of the photo on the page. You can also rotate the image to 90 degrees and also fill the page with copies of the image. The **Print setup** button allows you to specify the page size and printer parameters. The **Print** button sends the image to the printer. Print the image and cut it out of the sheet of paper.
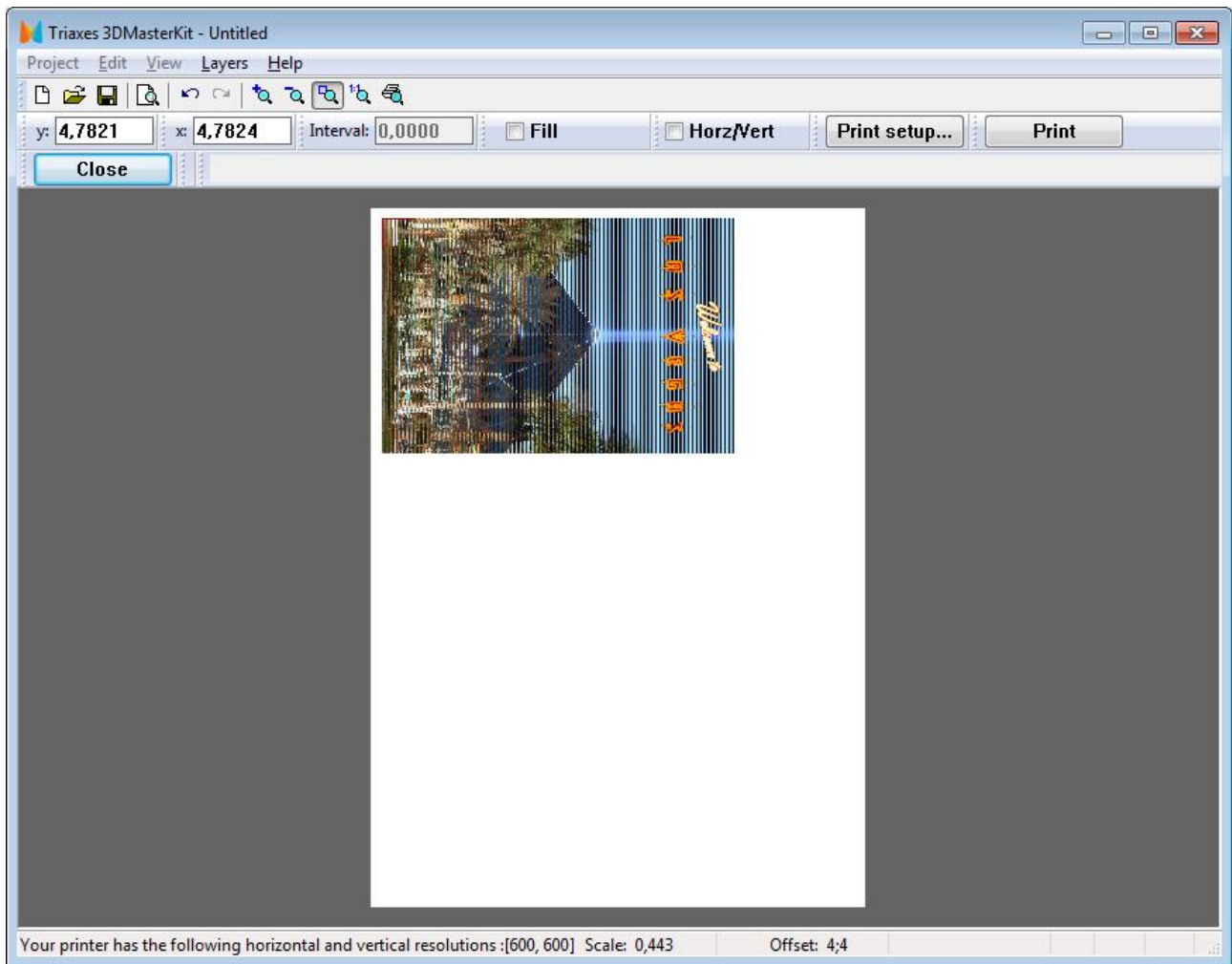
Fig. 4.15. Print preview

4.1.2 Applying lenticular screen

Lenticular screens are attached to paper by means of the cold lamination. First, a lenticular screen is covered with an adhesive layer that has a protective transparent film. When you attach it, the protective film is removed and the lenticular screen is attached to the paper. It is best to use a laminator that supports the cold lamination function. Before attaching make sure that you orient the lenticular screen in such a way that it's lenses are parallel to stripes on the encoded image. A good lenticular effect is achieved when the pitch of the encoded image coincides with the pitch of the lenticular screen and when the encoded stripes are parallel to the lenses on the lenticular screen.

1. Fold up about one centimeter of the protective film:

Fig. 4.16 Fold up 1 cm of the protective film

2. Apply the smooth side of the lenticular screen to the image making sure that the opened adhesive layer does not touch the paper.

3. Press the covered part of the lenticular screen to the image and watch the moire effect that appears due to the interference of the stripes on the encoded image with the lenses on the lenticular screen (fig. 4.17).

Fig. 4.17. Applying the lenticular screen to the image

Slightly rotate the lenticular screen relative to the paper to remove the moire effect (fig. 4.18). A special tuning frame around the image helps to orient the lenticular screen correctly.
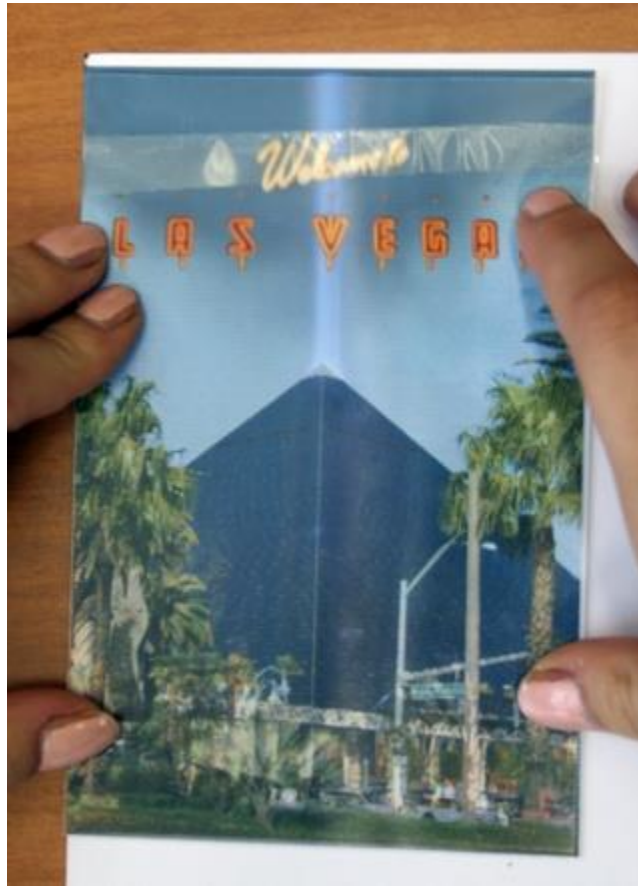
Fig. 4.18. Orienting the screen

4. Changing the viewing angle back and forth along the direction perpendicular to the direction of the lenses on the lenticular screen, check how precisely the images replace each other (fig. 4.19).

Fig. 4.19. Precision of the images changing

5. After you align the position of the screen, carefully press the opened adhesive layer to the paper:

Fig. 4.20. Pressing the adhesive layer to the paper

6. Turn on the laminator (in the cold lamination mode or with a minimal heating – to remove bubbles). Hold the turned-up side of the protective film:

Fig. 4.21. Holding the film

Run the lenticular screen through the laminator removing the protective film as the screen is moving:

Fig. 4.22. Lamination

Now you only have to cut off the superfluous screen or paper on the sides of the image. This operation is required only if the size of the screen exceeds the size of the photo or vice versa.

Fig. 4.23. Finished lenticular photo

4.2 The process of making a multilayer photo

In order to create a stereo-image from some ordinary picture we have to do the following (see also section 2.11):

1. Launch 3DMasterKit, open a multilayer template and a photo.

2. Arrange template elements (layers) and a picture on a canvas the way you like.

3. Set foreground and background parallaxes values.

4. Locate layers and a photo according to their depth using relative depth scale.

5. Give a command to generate a sequence of stereo-frames.

6. Encode a stereo photo of any type: lenticular, anaglyph, etc.

A set of multilayer templates created by professional designers, is included in 3DMasterKit software package. Templates can be seen on triaxes.ru, «Templates» page.

Start by launching 3DMasterKit and loading frames as layers by selecting the **Layers >> Add menu** command (hot keys: Alt+Shift+O).

In the **Open Frames** dialog select files containing photo and template, and then move them to the right list by clicking the right arrow button(fig. 4.24).
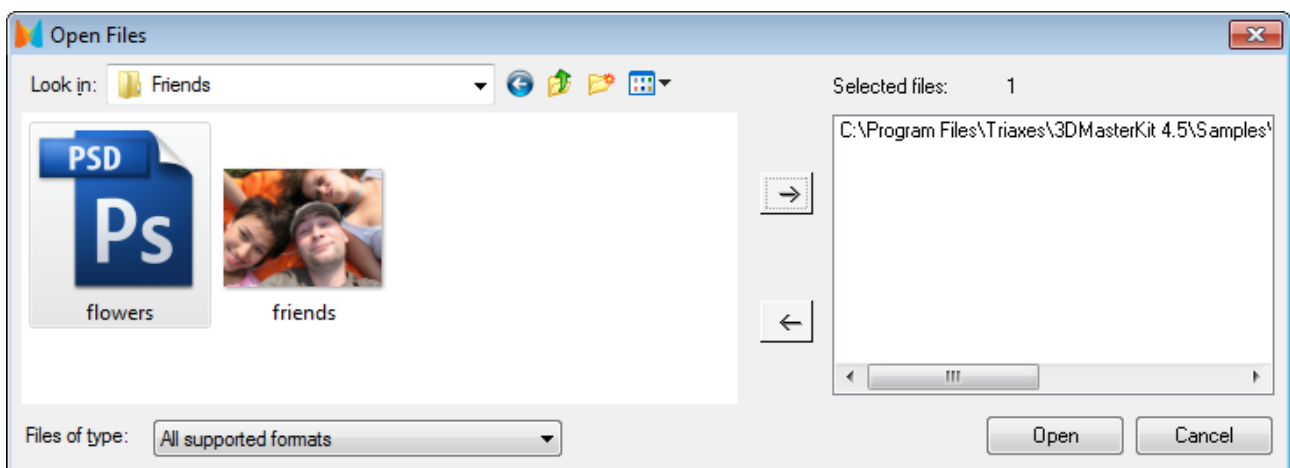

Fig. 4.24. **Open layers** dialog**.**

After the **Open** button is clicked, a photo and template layers will be displayed in the layers list, on the right side of the screen (fig 4.25).
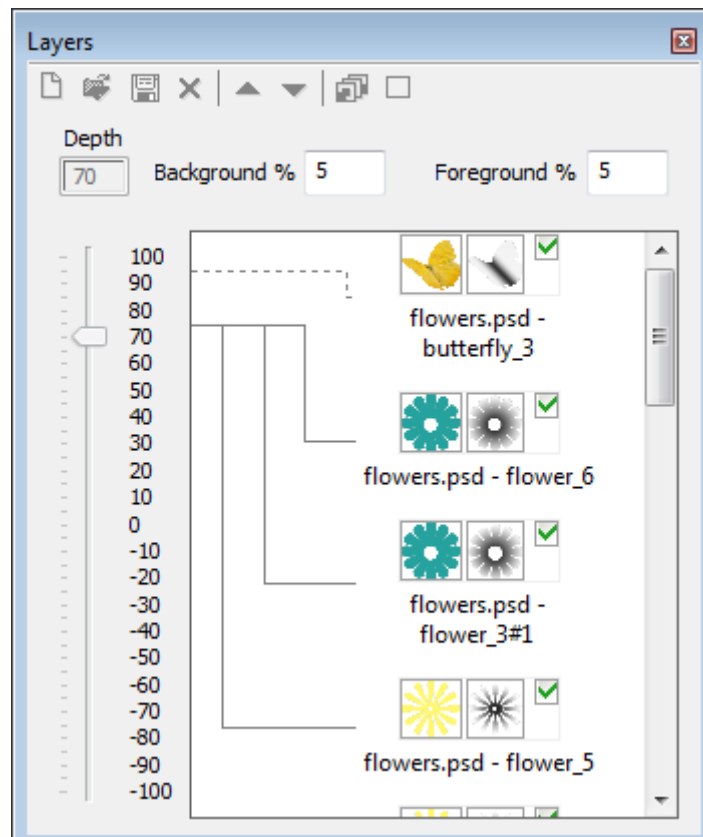

Fig. 4.25. Layers list

Layers are displayed being overlapped on each other in the main window of the program. Green check mark on the right side of toolbar shows if the set of layers is shown on the work area, while a check mark to the right of the layer shows if it is to take part in frame sequence generation.

We start by adjusting our project a little. In order for one of the layers to be a background for a photo while all the rest to be on top of it, we need to move the background image to the bottom of the list, putting the photo above it.

Click the left mouse button on the layer thumbnail image in the list or click on the image itself directly in the work area holding **Ctrl** key to activate it (it will be highlighted with red). Then press the «down» button on the toolbar of the layers window to move the layer down. Buttons for moving up and deleting a layer are located nearby. After moving the photo down you'll get the necessary arrangement of the layers.

Attention!

Starting from 3DMasterKit version 4.0, the order of layers in the list corresponds to their actual location: the higher the layers is, the closer it is to the spectator. To change the position of the layer, select it by clicking and move a slider on the depth scale to set a desired value.
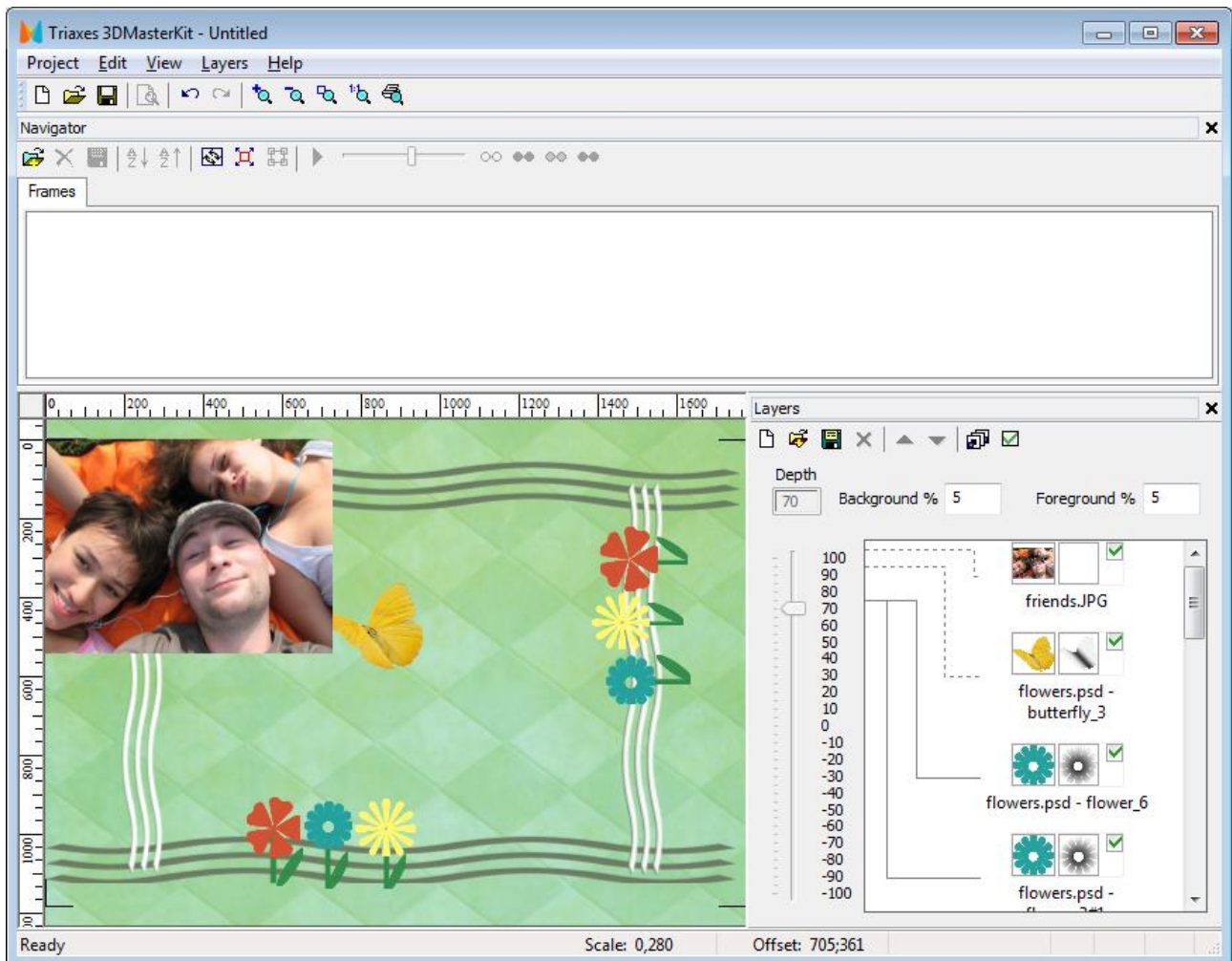
Fig. 4.26. A photo is smaller than a template

If a photo is a little bit smaller or bigger than a template, it is necessary to adjust photo's

size in that way, that it could be proportionally located in a template. For that select the **Edit >> Transform >> Scale** menu command (hot keys **Alt+S**). After that, around the current image a running frame (marching ants) will appear. Press the left mouse button at any place on the screen, and, while holding it, adjust new proportions of the image being scaled. Release the left mouse button only when this is completed. Scaling is done in relation to the center of an image. In case of a wrong scale, repeat this step over.

Move the layer with the photo closer to the center of the template. Switch to the movement mode by clicking the right mouse button at any place on the screen. Click the photo with left mouse button and drag it to the desired place, release the button when done.

You can change location of any layer in the same way. It is sufficient to select it in the list and move to a desired position.

Menu command **Edit >> Transform >> Rotate** (hot keys **Alt+R**) allows rotation at user-specified angle. To exit the scaling and rotation mode press **Esc** key or click right mouse button.

Repetitive use of scale and rotation operations in 3DMasterKit does not cause the loss of image quality. At any stage of editing it is possible to undo or redo recent actions.

To save the result choose **Project >> Save** project from a menu, or press Ctrl+S and type in the file name.

After completing our project composition, we set parallaxes values for foreground and background in respective fields – **Foreground parallax** and **Background parallax**. Then

we allocated layers in depth in relation to each other. In order to do this we select a layer from the list and move up or down the depth scale slider.

Attention!

The optimal values of foreground and background parallaxes are defined by experiment. In this project as an example we set the value to 5, while you may try other values. In our opinion, the best result is achieved with parallax values of 5 to 7.

After we have correctly allocated layers on the canvas and set a relative depth, it is possible to set a map of depth for each of the layers (see also 2.5.3). In order to do that we right click on the thumb-nail image of the layer to which we want to attach a map of depth and select **Load depth map**.
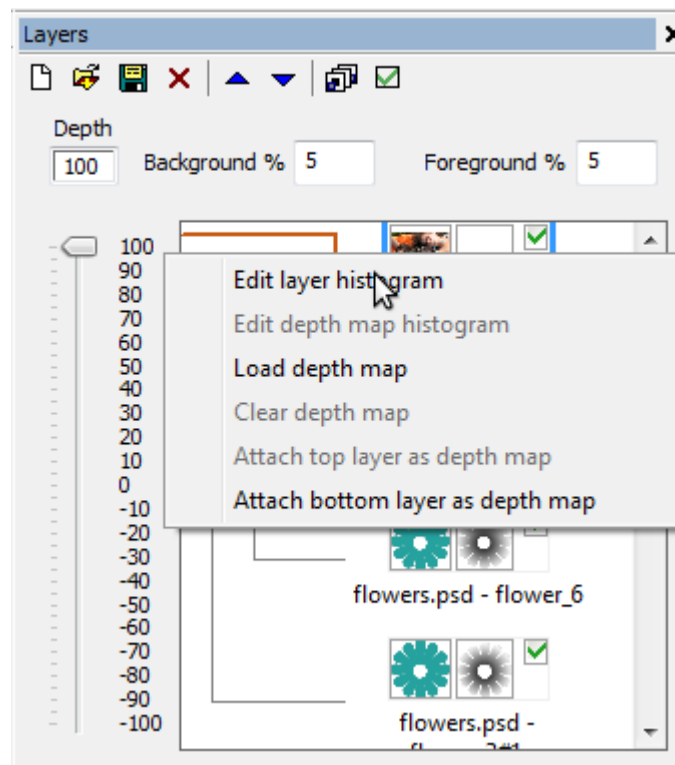

Fig. 4.27 Adding a depth map

A depth map can also be added when preparing a template in Photoshop. In this case a depth map will be stored as a separate layer directly in y template. When preparing for encoding in 3DMasterKit it will be necessary to specify which layer does this depth map relate to. In order to do this a depth map layer has to be located below the original layer in the list. After that right click on the original layer thumb-nail image and select **Attach layer below as depth map**.

When adding a depth map a thumb-nail of it has to appear to the right of an icon.

The preparation stage is completed. Now we may proceed to the frame sequence generation process. Select **Layers >> Generate multilayer stereo** menu command (hot keys: **Alt+G**). The Generate multilayer stereo dialog will appear (fig. 4.28).
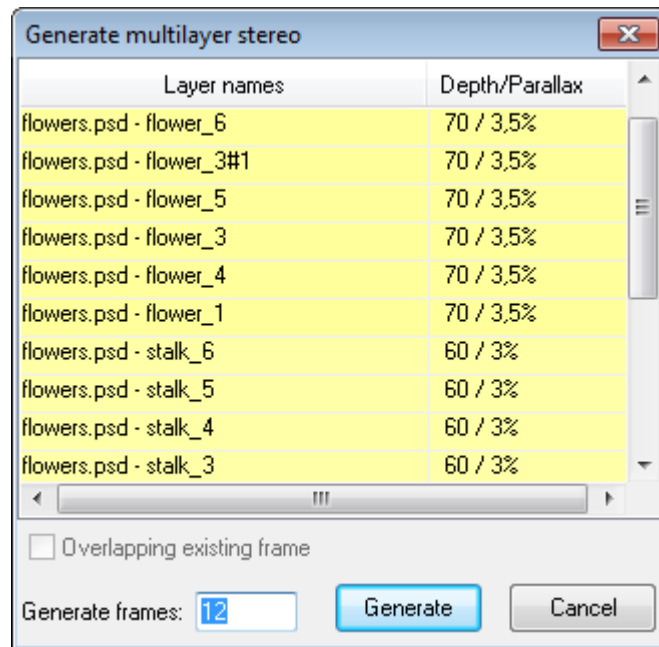
Fig. 4.28. Generate multilayer stereo dialog

In Generate multilayer stereo dialog, depending on the set relative depth за a layer, the line in the list will be illuminated with tint of blue or yellow color. Yellow means, that the layer will be "protrude" from the plane, blue - that the layer will be in depth. Further the layer is from the plane, thicker is the tint of a line in the list.

In Generate multilayer stereo dialog we set the number of frames to be generated and press **Generate**.

For the creation of an anaglyph image two frames will suffice, while for a lenticular multi-view stereo image a whole series of frames is required.

In order to calculate the minimal number of frames needed for the creation of lenticular multi-view stereo image the following formula may be used:

$$\textbf{Nmin = Res/Pitch}$$

where **Nmin** – is the min number of frames generated, **Res** – is the printer resolution (in pixels per inch (ppi), shown in 3DMasterKit printing unit status bar), and **Pitch** – is the number of lenses per inch (lpi) for lenticular screens. The result is rounded to the nearest whole number and it is included in the fourth parameter.

After adjusting all settings and pressing **Generate** we acquire a series of frames in the image list of the **Navigator tab** (image series in the top of the 3DMasterKit window) as shown in fig. 4.29. The *Active* and the *Left frames* are displayed with semi-transparent overlapping in the working area of the program. The rightmost image of the generated series of frames is set as the *Active* and the leftmost set as the *Left frame* by default.
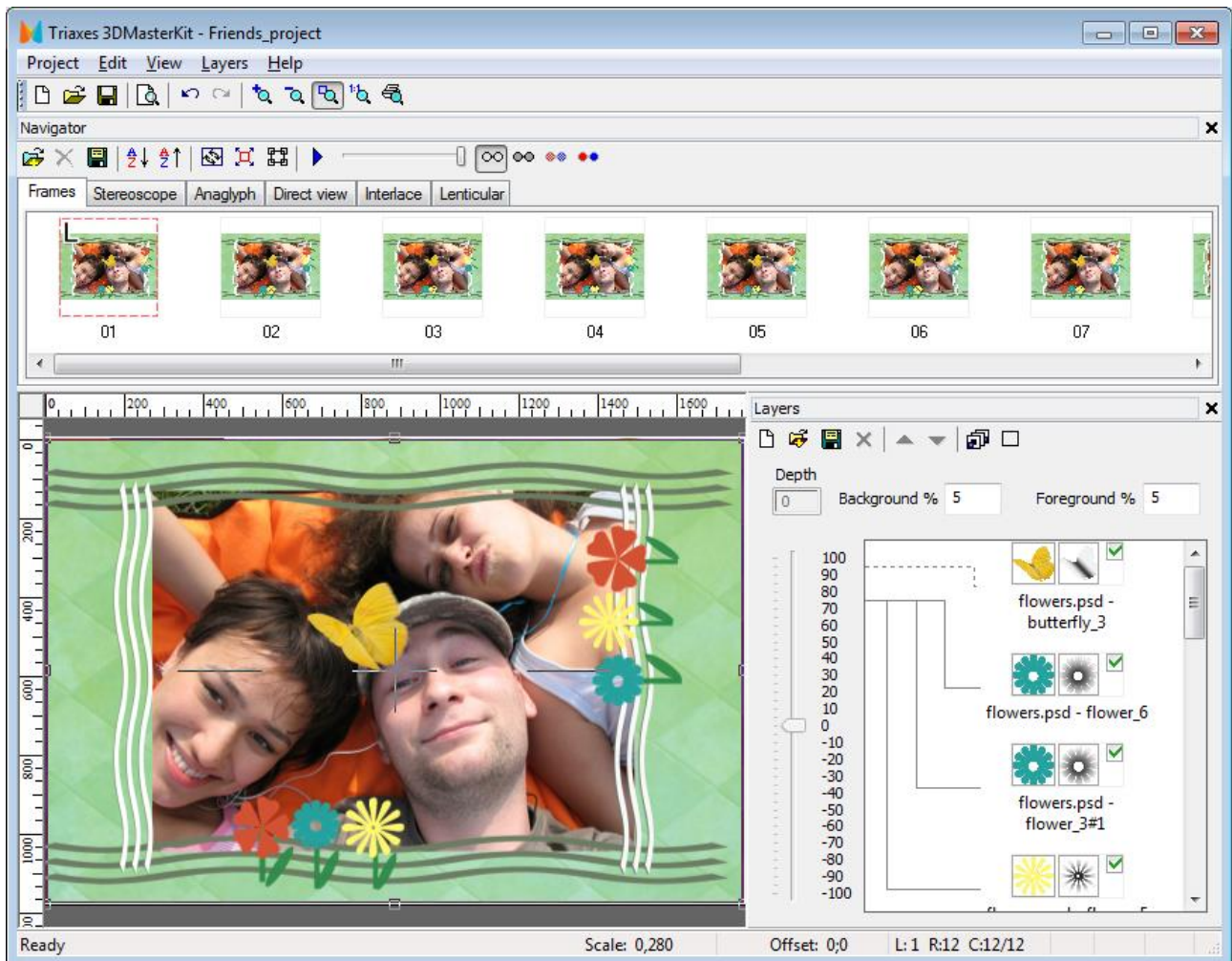
Fig. 4.29. Generated frames sequence

After generating frames, layers are no longer shown in the work area - we notice that the check mark in toolbar has disappeared. Thus, layers do not cover images created. Layer view switches on automatically when actions with layers are performed.

This provides a way to conveniently process several photos in one template using following scheme:

a) several photos are added to the template

b) all photos are located to the zero layer

c) viewing flags are used (check marks at thumb-nail images in the list of layers) and needed photo is chosen.

d) frames sequence and a lenticular image are generated.

Steps "c", "d" are repeated for each photo added to the template.

If for whatever reason you are not satisfied with generated frames series (e.g. there was a mistake in parameters), it is possible to undo generation by pressing **Ctrl+Z**, choosing **Edit >> Undo** menu command, or selecting respective frames and pressing **Delete** key.

Working with lists in 3DMasterKit is similar with working with Windows lists: you can select a group of objects holding **Shift** key, or separate objects by pressing **Ctrl**. To make all layers invisible it is necessary to select an extreme layer, press **Shift** and click the check mark to the right of the layer located on the other side of the list.

To quickly evaluate the stereo effect you may switch to anaglyph mode and use colored glasses (fig. 4.30).
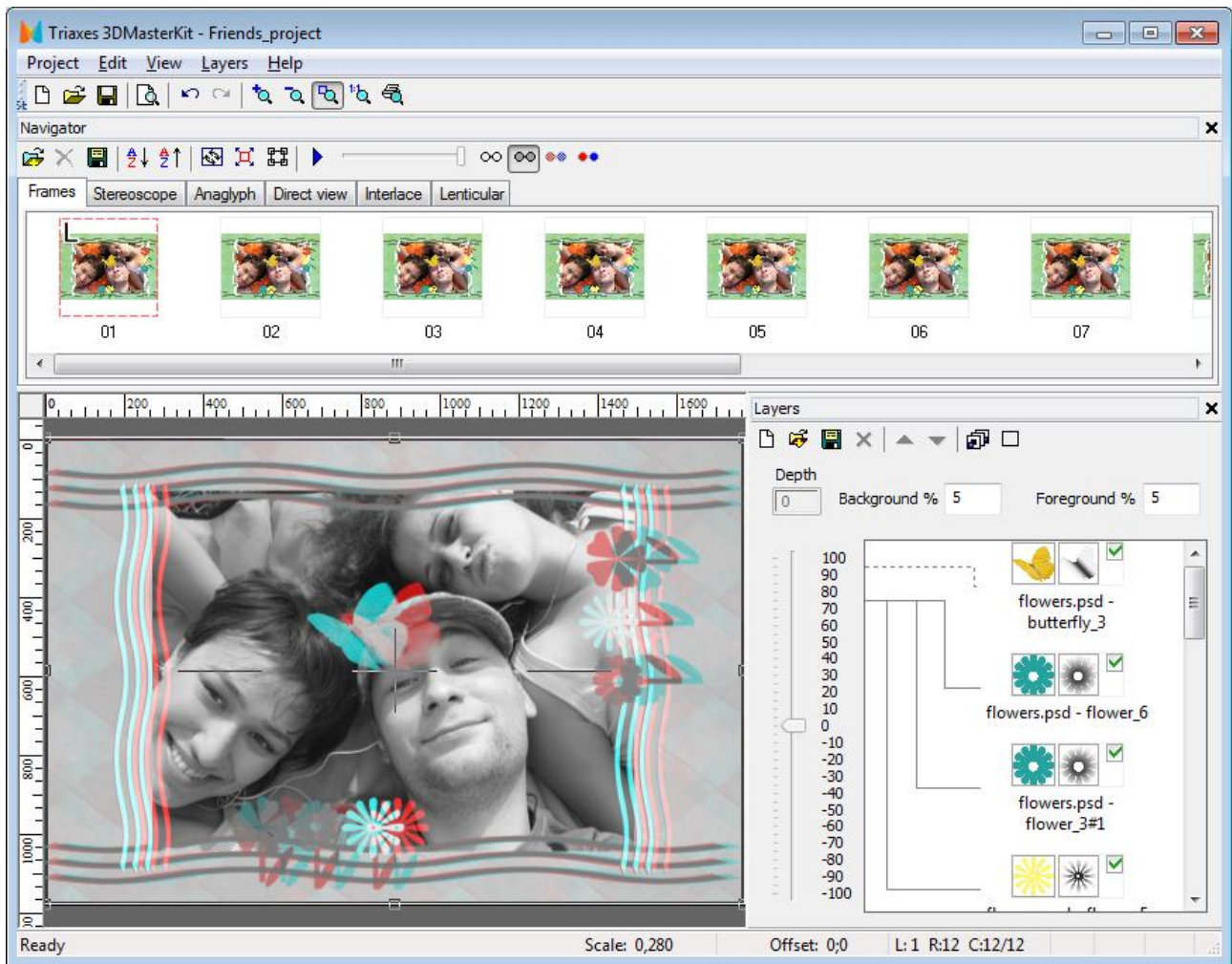
Fig. 4.30. Anaglyph view mode for frame series

If you have no anaglyph glasses at hand, a stereo effect can be seen by creating a stereo pair for direct view (**Direct view** tab). The stereo pair is shown in fig. 4.31. In order to see dimensions look at the photo, relax your eyes as you do when you look at distance. If you have managed to do that, you are going to see three pictures, and the one in the center will be in 3D.
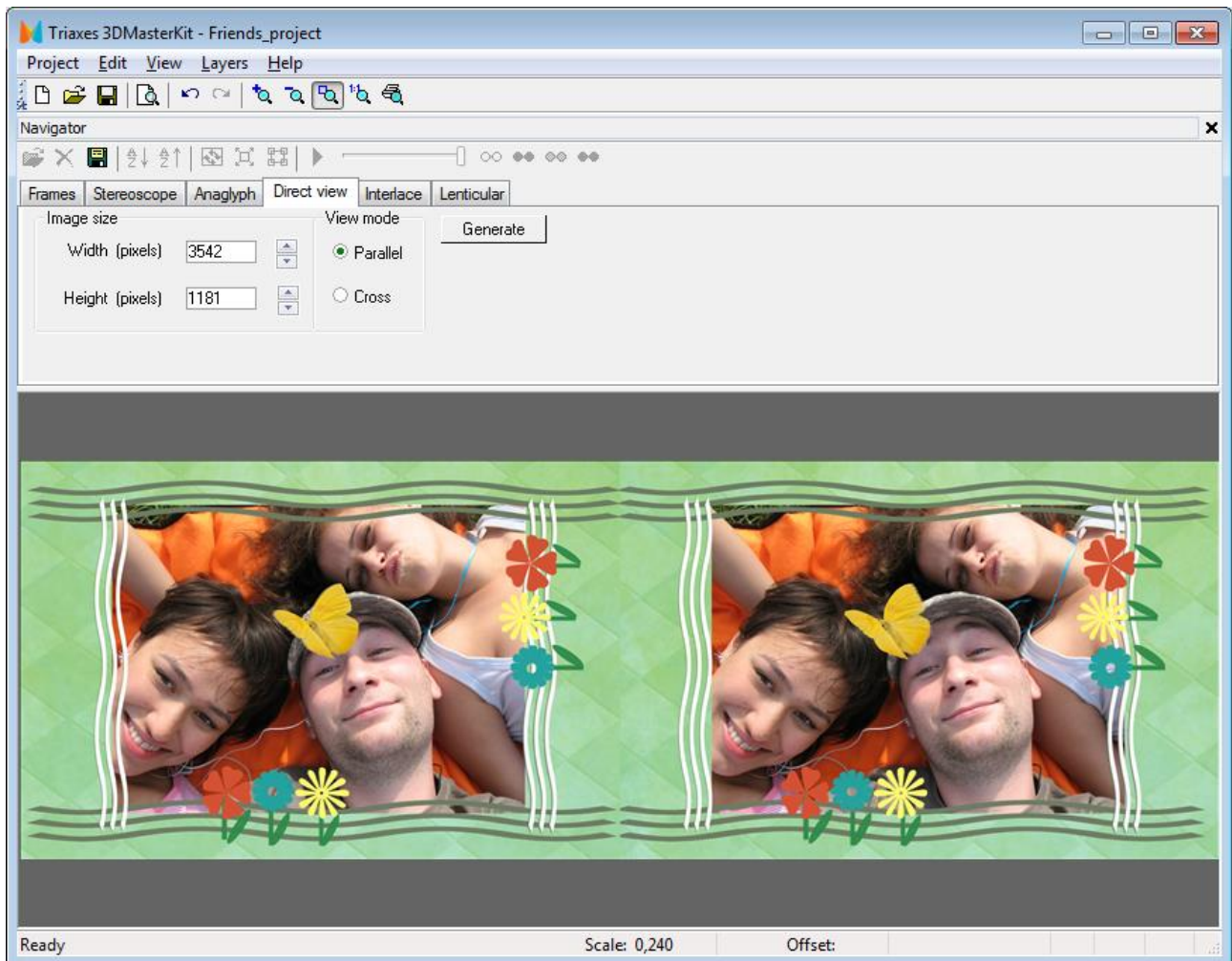
Fig. 4.31. Stereo pair for a direct view (parallel method)

You can save generated sequence of frames on disc, with the **Project >> Export frames** menu command.

Generated frames are modeling a multi-view stereo photography. Frames are already aligned in relation to each other, so there's no need to make a compensating shift, you may switch directly to a tab with the needed encoding method.

E.g., in fig. 4.32 a creation of an anaglyph stereo photography is shown.
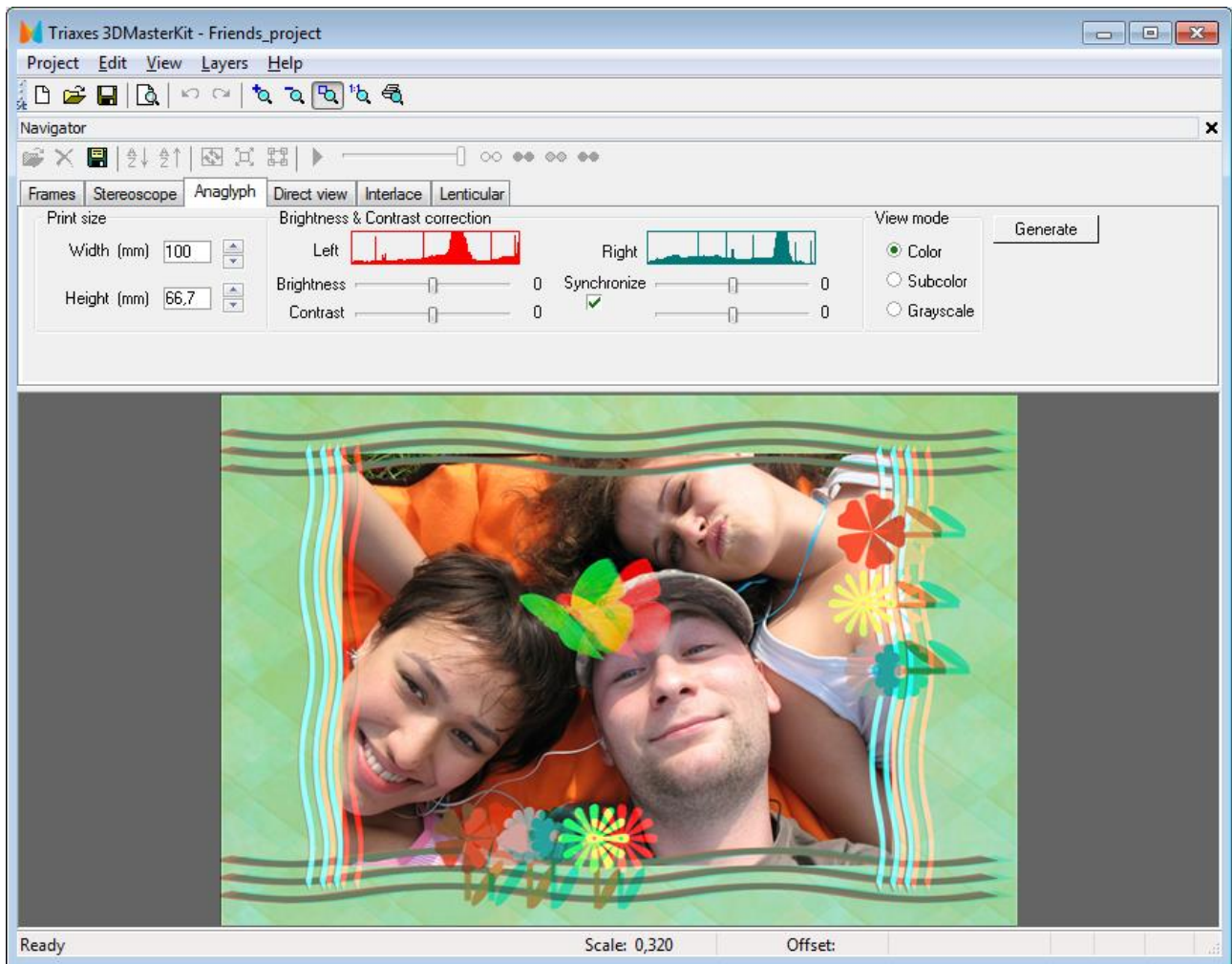
Fig. 4.32. An anaglyph stereo picture

For the lenticular encoding, turn to the **Lenticular** tab, and adjust the size and the pitch of the lenticular screen, select a resolution and click **Generate**. The result is shown in fig. 4.33; after that print an image and attach it to a lenticular screen.
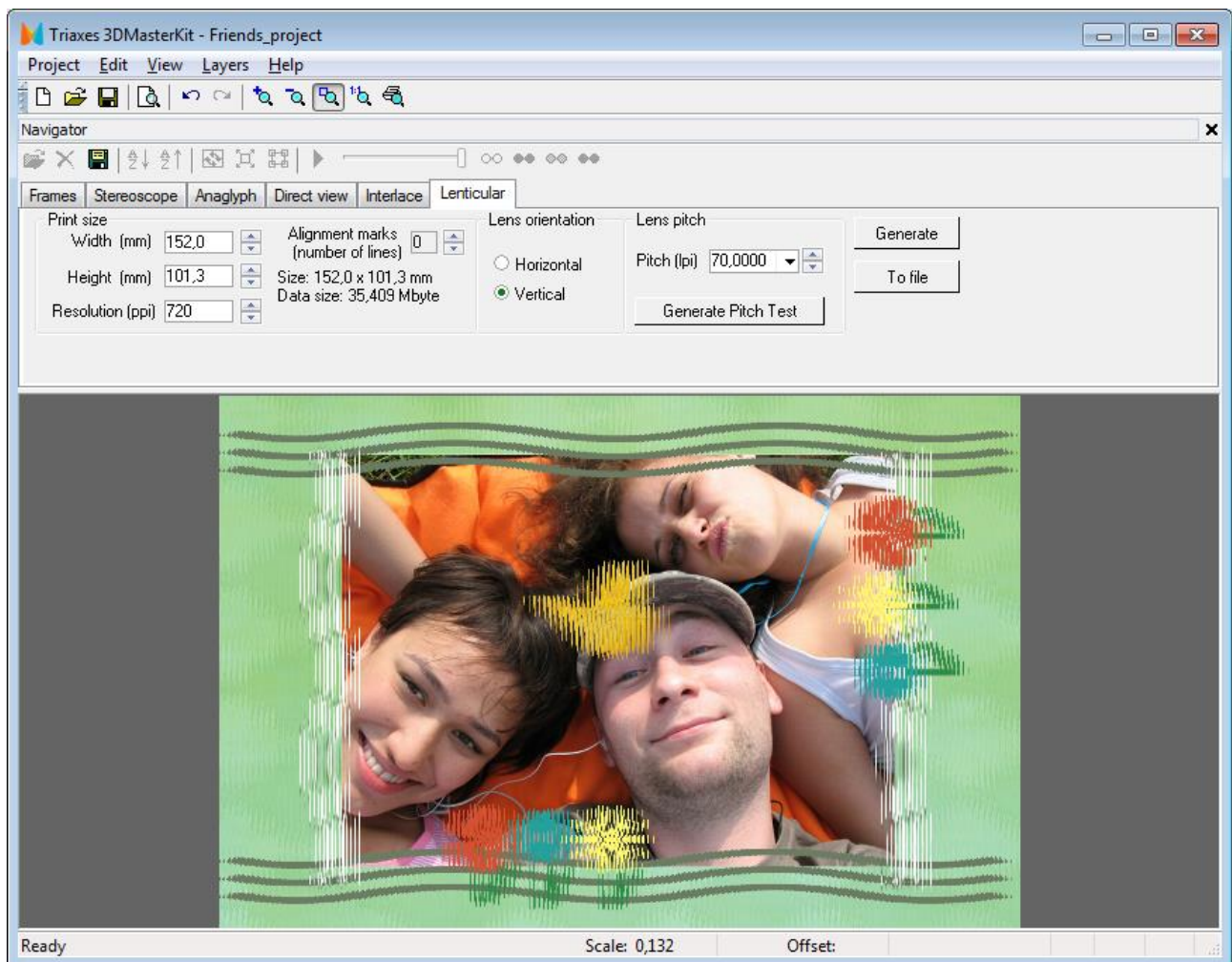
Fig. 4.33. An encoded image for lenticular stereo image