



FlipFactory®

MOTIONRESOLVE™ FILTER

MAINTAINING VISUAL QUALITY
WHEN SCALING VIDEO

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This
App Note
applies to
versions
4.0
& Later



Synopsis

FlipFactory's MotionResolve filter specifies which internal video frame and field processing methods are employed during transcoding to provide the best encoded image quality output. MotionResolve processing is based on perception of motion — or lack of it — between input fields over time.

MotionResolve processes interlaced media input to improve visual clarity on interlace or progressive video output. MotionResolve's algorithms work best when input video is of highest quality. Noise introduced by low-quality video or previous compression, for example, may be falsely identified as true motion, and this reduces MotionResolve's overall effectiveness.

Note: *When enabled, MotionResolve increases the time (usually 20-50%) to transcode a file. Transcode time is also significantly affected by frame size. Plan your workflow accordingly.*

Benefits of Using MotionResolve

Use the MotionResolve filter on interlaced input to eliminate motion-induced field conflicts and maintain detail, reduce motion artifacts, and reduce jaggies, especially when upscaling content.

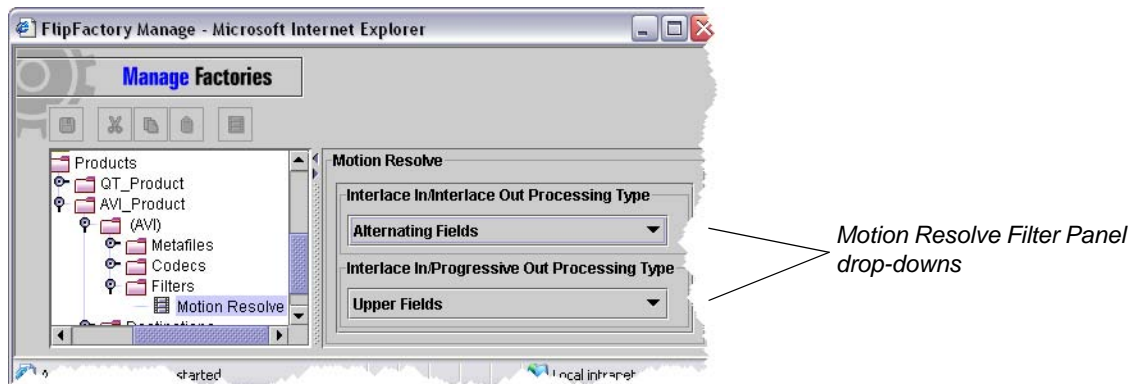
Use the MotionResolve filter to improve visual quality when:

- Transcoding interlaced-to-progressive media, for example,
 - HD up-conversion — 525/60 (NTSC) to 720p
 - 625/50 (PAL) to Windows Media full-screen
 - 525/60 to Real full-screen
- Resizing interlaced-to-interlaced media, for example,
 - HD up-conversion (525/60 to 1080i)
 - Standards conversion (525/60 to 625/50)

Filter Parameters

The settings in the two drop-down menus (see [Figure 1](#)) — Interlace In/Interlace Out and Interlace In/Progressive Out — are mutually exclusive. You only select from one, based on your output media. FlipFactory uses either the Interlace In/Interlace Out Processing Type setting or the Interlace In/Progressive Out Processing Type setting depending on the codec you select for a product, only if input is interlaced. Progressive input is not processed by the MotionResolve filter.

Figure 1. MotionResolve filter editor panel



Telestream's MotionResolve technology is enabled and applied when you select Motion Resolved Frames from Interlace In/Interlace Out Processing Type or Interlace In/Progressive Out Processing Type drop-down menus. An explanation of each setting follow:

Interlace In/Interlace Out Processing Type. Select from this menu only when you are processing interlaced input and outputting media as interlaced. Choose from:

- **Alternating Fields** – Disables MotionResolve. Independently resizes upper and lower fields for corresponding output fields, with no change in field content. If resizing is required, then each video field is resized independently.
- **Motion Resolved Frames** – Enables MotionResolve to create an entire frame at the field rate by analyzing fields over time and merging them as appropriate, generating composite output fields that comprise the frame.

Interlace In/Progressive Out Processing Type. Select from this menu only when you are only when you are processing interlaced input and outputting media as progressive. Choose from:

- **Upper Fields** – Disables MotionResolve. Uses only upper fields to create output frames. When you are down-scaling video (for example, 720x480 to 320x240), this option saves processing time compared to MotionResolve processing and may provide adequate detail.
- **Alternating Fields** – Disables Motion Resolve. Uses upper and lower fields to create progressive output frames. This may be a good option when the source media has a lot of detail but little motion, or when transcoding media to be viewed on interlaced monitors. Considerably faster than MotionResolve processing.
- **Lower Fields** – Disables MotionResolve. Uses only lower fields to create output frames.
- **Motion Resolved Frames** – Enables MotionResolve to create an entire frame at the field rate by analyzing fields over time and merging them as appropriate, generating composite output frames.

MotionResolve Examples

This app note provides three examples to demonstrate typical uses for MotionResolve:

[525/60 to 525/30p \(Windows Media\) Conversion on page 5](#)

[525/60 to 625/50 Conversion on page 7](#)

[525/60 to 720p Conversion on page 10](#)

These examples assume that...

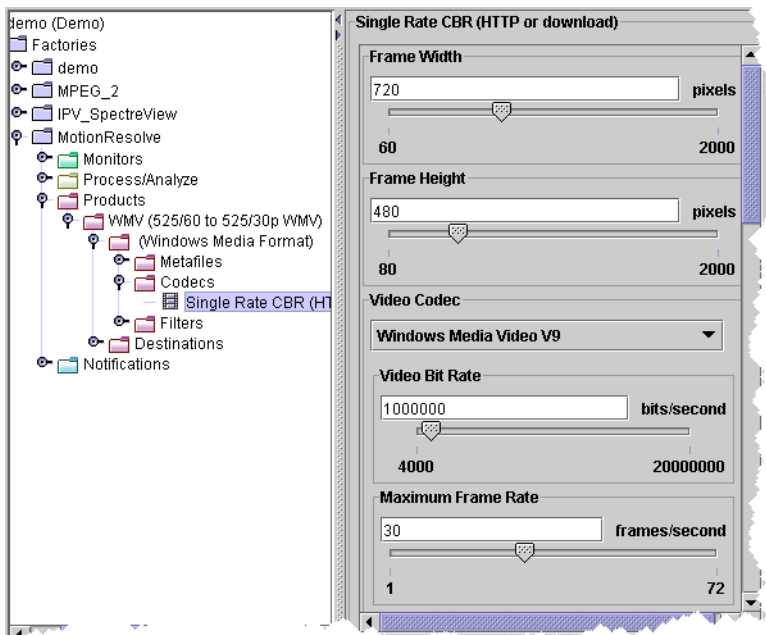
- You have a working knowledge of FlipFactory
- FlipFactory is properly installed and running
- Your source media file(s) are in a location where FlipFactory can access them
- You have installed the appropriate product license(s)

SD NTSC >> Windows Media Conversion

You can convert SD NTSC with lots of action/motion to high-quality, progressive Windows Media using FlipFactory and MotionResolve. To set up a factory for this workflow, perform these tasks:

- Create a new factory and name it appropriately.
- Create a product in your new factory and select Windows Media as the media format.
- Select the codec, frame size, bit rate and maximum frame rate, as appropriate for your codec.

Figure 2. Single Rate CBR codec editor panel example

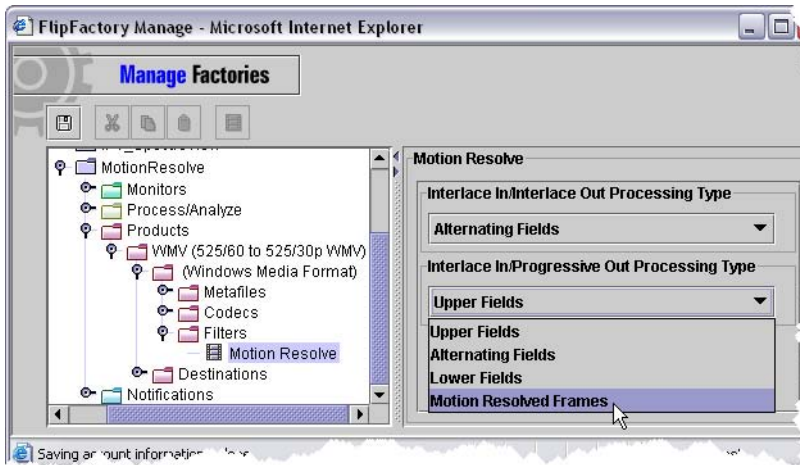


Increasing Video Quality will produce greater visual clarity at the expense of smoother motion. In CBR it may drop frames.

- Set the Audio Profile settings to meet your requirements.
- Add the MotionResolve filter to improve visual clarity.

Because Windows Media is a progressive format, choose Motion Resolved Frames on the (bottom) Interlace In/Progressive Out Processing Type drop-down (see [Figure 3](#)).

Figure 3. Choose Motion Resolved Frames from Interlace In/ Progressive Out menu.



- Set up a Local Folder as the Destination for testing and save your factory.

View the Results

To test your new factory, submit an interlaced file to be transcoded into Windows Media format.

To see your results, open the Local Folder target directory and double-click the output file to play it in Windows Media Player.

Congratulations! You've completed a conversion to the Windows Media format and should see the benefits of MotionResolve in the new file.

SD NTSC >> SD PAL Conversion

Conversions from NTSC (525/60) to pal (625/50) present two special challenges: the image must be scaled up, and the frame or refresh rate must be slowed down. Many solutions to these conversion challenges create new problems: jerky, shaky, or jumpy images caused by field inversion, and/or “soft” images caused by spatial interpolation between input frames.

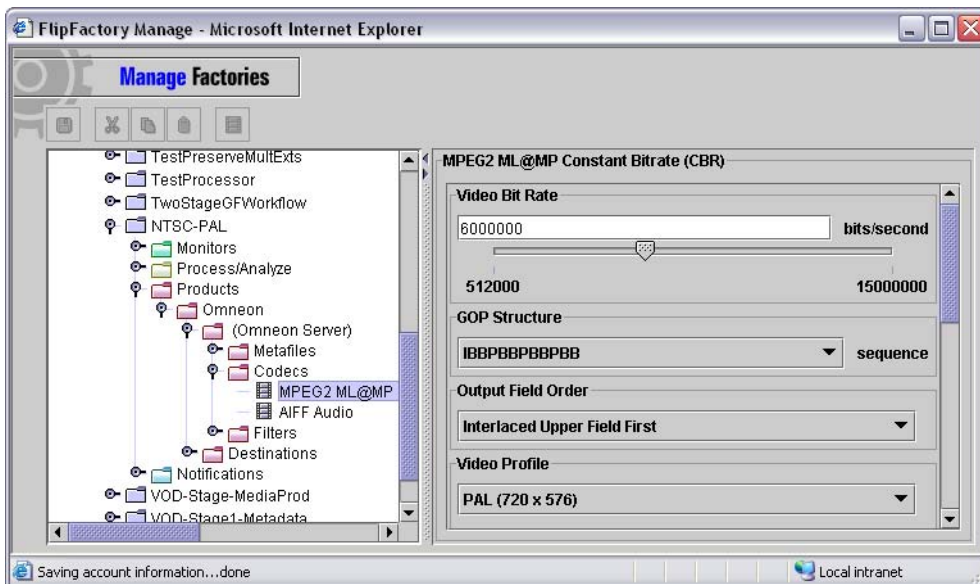
Field inversion results when your input field order does not match your output field order, for example when input is upper field first and output is lower field first. *Spatial interpolation* is the result of creating a field from the opposite field. That is, creating a lower or bottom field from an upper or top field, or vice versa. These problems are evident when viewed on interlaced television monitors and more difficult to detect on a progressive computer monitor.

FlipFactory offers solutions to resolve these issues and more, in addition to the image quality output benefits available when you use the MotionResolve filter. The following procedures employ several of these solutions.

To set up a factory workflow to convert an upper-field first NTSC file to PAL, follow these steps:

- Create a new factory and name it appropriately.
- Create a new product, and choose Omneon Server as the media format.
- Set up the codec to meet your requirements:

Figure 4. Omneon Server codec settings example

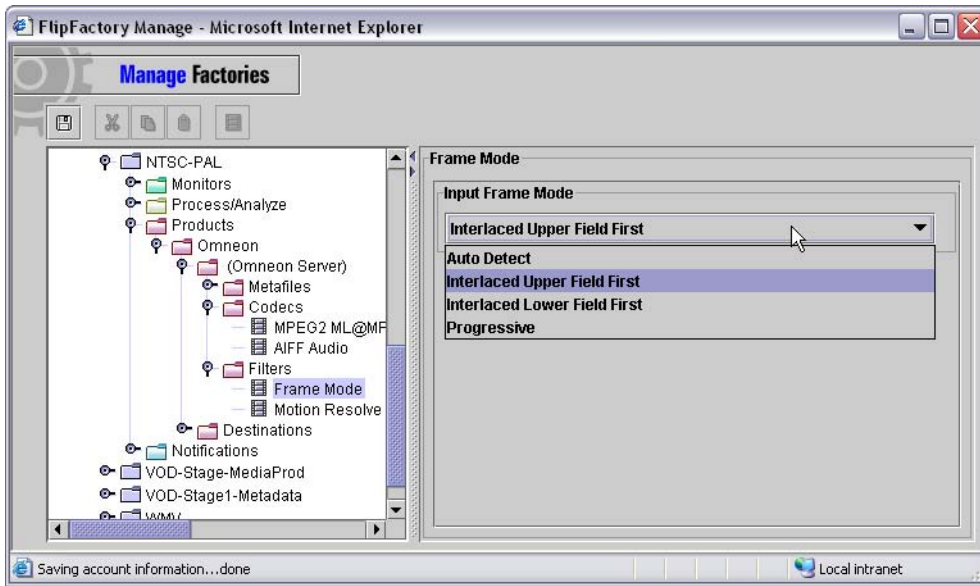


- In your MPEG2 video codec, set the Output Field Order to Interlaced Upper Field First, and set the Video Profile to PAL (720 x 576 or other frame size).
- Add the Frame Mode filter and configure by setting Input Frame Mode to Interlaced Upper Field First, to force FlipFactory to process this video as upper field first.

Note: *FlipFactory* assumes that video with a frame rate of 29.97 fps and frame height of 480 or 512 is interlaced upper field first; video with a frame rate of 25fps and a frame height of 576 or 608 is interlaced lower field first.

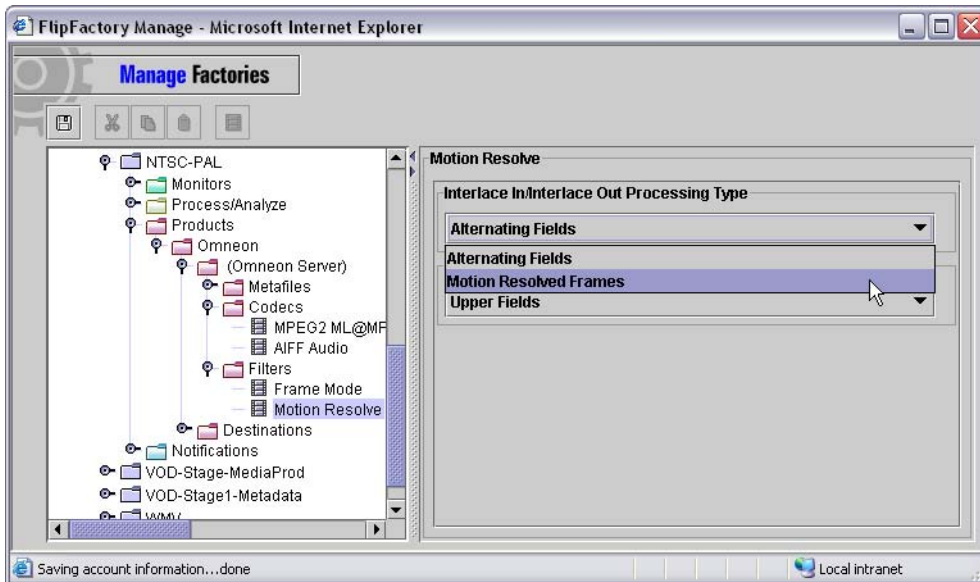
Most Avid files and all DV video is lower-field-first.

Figure 5. Specifying field order in Frame Mode



1. Enable the MotionResolve filter to improve visual clarity.
2. Set Interlace In/Interlace Out Processing Type to Motion Resolved Frames:

Figure 6. Choose Motion Resolved Frames from Interlace In/ Interlaced Out menu



- Set up a Local Folder as the Destination for testing and save your factory.

View the Results

To test your NTSC >> PAL factory, submit an NTSC interlaced file.

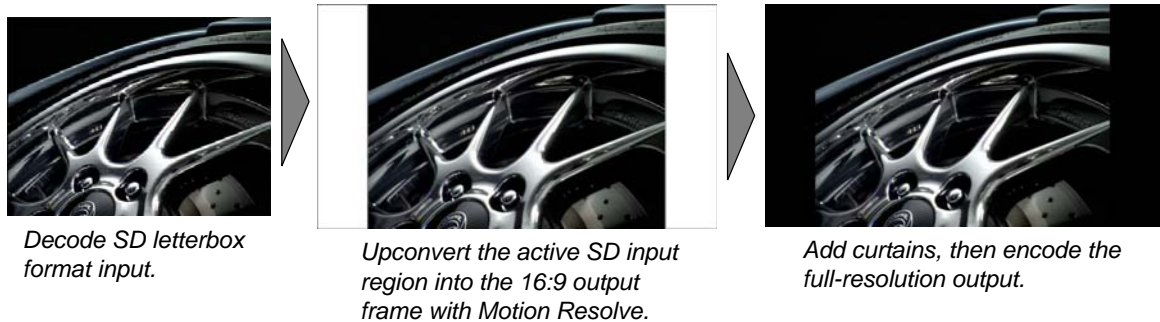
To view your results, move the file from your Local Folder destination if necessary to a location where you can play out the new video on an interlaced monitor or television.

Congratulations! You've completed a conversion from NTSC to PAL and should see the benefits of MotionResolve in your new file.

SD NTSC >> HD 720p Conversion

Conversions from SD NTSC to HD 720p (progressive) present three special challenges: the image must be converted from interlaced to progressive, it must be scaled up, and to preserve the entire screen, the aspect ratio must be changed from 4:3 to 16:9 by adding side curtains. (For a discussion of options you can employ when converting SD to HD formats, see the FlipFactory SD to HD Conversion App Note, available on the Telestream Web site.)

Figure 7. Convert 4:3 SD >> 16:9 HD by adding side curtains and employing MotionResolve



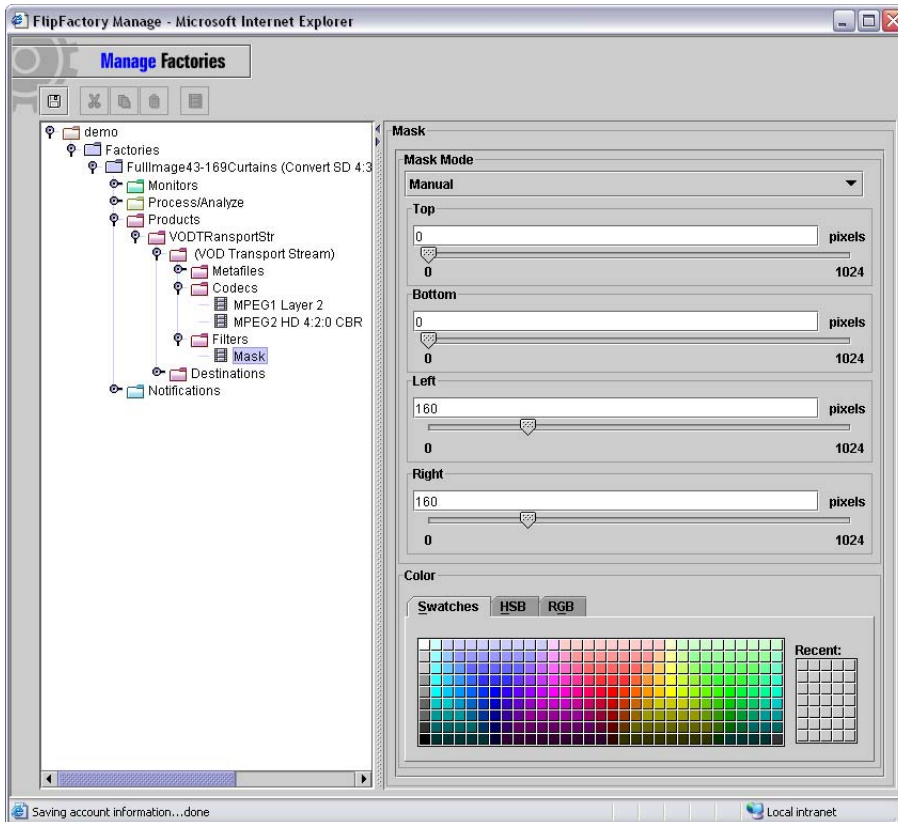
Most solutions to these conversion challenges create new problems: loss of image sharpness, and introduction of motion artifacts. *Loss of image sharpness* during scaling usually results from using only the upper field or lower field or inaccurately assembling upper and lower fields to build a progressive frame. FlipFactory's MotionResolve filter resolves these issues and more.

Note: *Converting SD NTSC to HD 1080i is similar. It involves setting the mask filter for 1080 width, and setting your HD profile codec to a 1080i profile. See the FlipFactory SD to HD Conversion App Note for detailed examples.*

To convert an NTSC SD file to an HD 720p file, perform these tasks:

- Create a new HD factory and name it appropriately. (Requires a FlipFactory HD license).
- Create a product in the factory with an HD profile. For example, VOD Transport Stream.
- Select a 720p profile, set the frame rate, video rate, and GOP structure.
- Add a Mask filter to supply side curtains on each side of the frames.

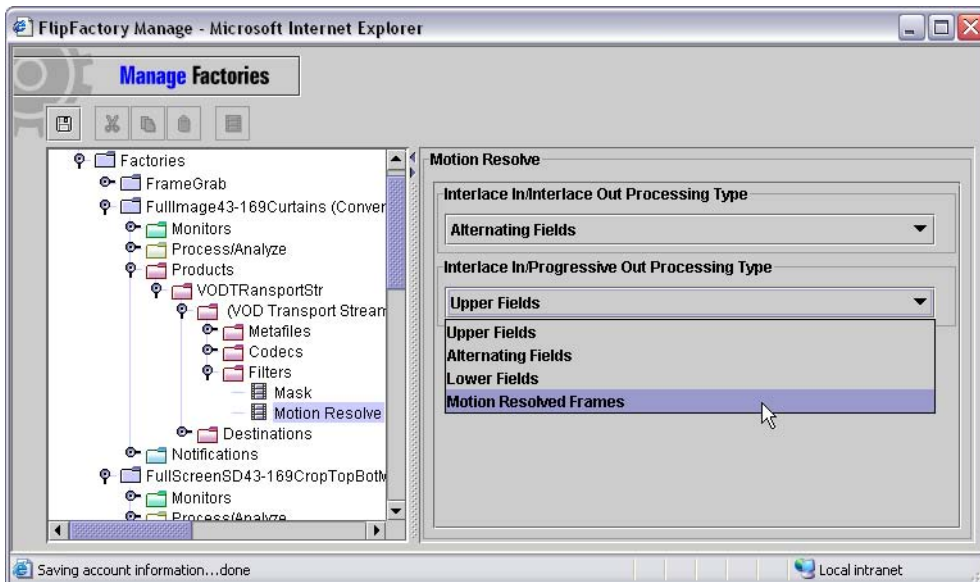
Figure 0-1. Use the Mask Filter to add side curtains



- For 720 profile output, total curtain width is 320. Even left & right curtains are 160 pixels wide.
- Add the MotionResolve filter to improve visual clarity.

Set Interlace In/Progressive Out Processing Type to Motion Resolved Frames.

Figure 8. Choose Motion Resolved Frames from Interlace In/ Progressive Out menu.



- Set up a Local Folder as the Destination for testing and save your factory.

View the Results

To test your NTSC >> HD 720p factory, submit an NTSC interlaced file.

To view your results, locate the file in your Local Folder destination and play it using Windows Media Player on your FlipFactory Server, or move it to a location where you can play it out to an HD monitor.

Congratulations! You've completed a conversion to the 720p format and should see the benefits of MotionResolve in the new file.

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FlipFactory has been designed for professionals skilled in the art of digital media transformation and workflow automation, to facilitate the automation of complex media operations and workflow that require a multitude of input and output media formats, delivery to numerous types of media devices and file systems, and notification of media systems including broadcast automation systems and media asset management systems.

The FlipFactory architecture and user interface is designed to provide maximum flexibility in the setup and configuration of these complex media transformations and workflow. In providing this high degree of flexibility, it is possible for media transformation and workflow processes to be configured that are impractical, likely to result in unexpected or unintended results, or beyond the limits of FlipFactory to perform satisfactorily. Additionally, FlipFactory may be executed on a platform that lacks the performance or capacity to perform the media transformations and workflow you've configured, which is your responsibility to specify. Telestream has chosen to implement FlipFactory to provide the greatest flexibility without limiting its functionality to only those transformations and workflow that are known with certainty to be within its performance capabilities, including those limits imposed by the platform upon which you have installed FlipFactory.

Therefore, you acknowledge that you may create transformations and workflow that are impractical or beyond your FlipFactory installation's limits, and Telestream does not warrant that each transformation or workflow you specify or use will complete without error.

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Obtaining Support and Information

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Internet

Web Site: www.telestream.net

Technical Support: support@telestream.net

Licensing: license@telestream.net

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See our [Web site](#) for your regional authorized Telestream distributor.