



## madVR Envy

# MotionAI™ User Guide

Rev 1.26

## Table of Contents

Preamble .....	2
1.0 Introduction to MotionAI™ .....	2
2.0 How To Install MotionAI.....	3
3.0 Understanding, Controlling and Customizing MotionAI .....	4
4.0 Techniques for Evaluating MotionAI .....	10
5.0 Popular Scenes for Evaluating MotionAI.....	10
6.0 Acclimating To MotionAI .....	14
7.0 Known Issues and Limitations .....	14
8.0 Feedback Please.....	14
9.0 Frame Blending and Its Role in Evaluating MotionAI .....	15
10.0 Conclusion.....	15

## Preamble

As an emerging technology, MotionAI™ is in an exciting phase of development and refinement. While the technology is robust, we acknowledge that its current setup process may require a level of technical acumen. We've intentionally exposed all low-level controls to enable our advanced users to experiment freely and share their optimal settings with us.

Your insights are invaluable as we work toward creating user-friendly presets for easier and quicker setup. The aim is to quickly evolve MotionAI into an intuitive solution, consistent with the ease-of-use you've come to expect from the Envy. In the meantime, this guide serves as a comprehensive resource for how to manually configure and evaluate MotionAI, along with suggested starting values to facilitate your experimentation. Thank you for being an integral part of this exciting journey.

## 1.0 Introduction to MotionAI™

Welcome to MotionAI by madVR Labs—the industry's first and only AI-driven motion interpolation technology in a standalone video processor. MotionAI delivers unprecedented improvements in multiple aspects—image clarity, stability, detail, and smooth motion handling—for a transformative visual experience unlike any other.

For those unfamiliar with the term, motion interpolation is the process of creating new frames between existing ones in a video. This enhances fluidity, smoothness, and clarity, without introducing “judder”, also known as jerky or stuttering motion.

Engineered to counteract motion blur, judder and double contours, MotionAI tackles the challenges posed by modern projectors and displays that use sample-and-hold technology. To fully grasp the extent of this issue and how MotionAI provides a solution, refer to [“The Sample-and-Hold Effect: Understanding Motion Blur and Motion Artifacts in Modern Displays”](#). MotionAI can also be used to further reduce judder or eliminate it for an ultra-clear and realistic image if that's what the user desires. In any event, the amount of fine control over the strength and look of the motion handling is unprecedented.

Uniquely employing machine learning techniques that work at the per-pixel level—unlike traditional block-level algorithms—MotionAI not only results in a pristine, cinematic image often free of many common motion artifacts but also can outperform non-AI motion interpolation solutions commonly found in today's TVs and projectors. Even in challenging fast-motion scenes, MotionAI avoids the typical downsides of blur, tearing, and halos often encountered when using other such implementations.

Moreover, when used judiciously, MotionAI respects the filmmaker's intent by allowing precise control over blur and judder reduction. This means you can enjoy an authentic cinematic experience while reducing visual distractions, even at 24p frame rates.

With MotionAI, your display can also stay consistently locked at your preferred frame rate, eliminating HDMI signal changes, and providing a seamless viewing experience across different sources and playback options, depending on your overall system setup and preferences.

Unlike other motion interpolation algorithms that can compromise the original cinematic look and director's intent, MotionAI gives you extreme control over the amount of blur and judder reduction, so you can get the benefits of motion interpolation while still largely preserving the authentic cinematic experience.

## 2.0 How To Install MotionAI

### Installation Prerequisites:

MotionAI requires a madVR Envy Extreme MK1 or MK2.

### Step 1 - Upgrade Your Firmware:

- Navigate to the Envy Firmware Configuration Menu.
- Select "Experimental Builds" as the Build Type.
- Begin the firmware update to version 1.6.3.43 or later. This is a large download that may take a little while, depending on your internet speed.

### Step 2 - Install the GPU Driver Update:

- After updating the firmware, a new option will likely appear in the Firmware Configuration Menu, indicating a GPU Driver update is available. If you had a previous MotionAI version installed, or in other circumstances, you may already have the required GPU update. In which case you will not see this option in the Envy firmware menu, and you can skip ahead to Step 3.
- Proceed with this update. MotionAI will not activate until this update is performed.
- Note: This update is a two-stage process that includes an automated system restart and may take up to fifteen minutes. During this time, there will be a static message on the screen asking you to please wait. It may appear that no progress is being made, however this is normal. Please be patient and do not turn off your system or remove power during this process.

### Step 3 - Create MotionAI Profiles:

We highly recommend setting up profiles to help you easily activate and control MotionAI. This is especially helpful for experimenting with MotionAI to find your favorite settings, and quickly selecting your preferred settings, which may vary based on the content watched. Creation and use of profile groups and profiles are beyond the scope of this document. For information on creating and using profile groups and profiles, please see the [Introduction to Profiles Guide](#).

- Create a new Profile Group called "MotionAI On/Off". Create one profile in the group called "On".
- Create a new Profile Group called "MotionAI Strength". Create profiles in the group for the types of settings you may wish to use or experiment with. We use "Low", "Balanced", "High" and "Insane" as examples throughout this guide.
- Leave all newly created profiles empty for now. We will configure these profiles in Section 3.0.

## 3.0 Understanding, Controlling and Customizing MotionAI

In this section, we'll walk you through the necessary settings and steps to use MotionAI, including how to control its strength and any desired added motion blur, helpful in preserving the cinematic look and in some cases increasing motion resolution. We also cover tips and tricks for testing and optimizing MotionAI performance, including how to select the best output frame rate for your purposes.

### 3.0.1 Choosing the Outgoing Frame Rate

Ordinarily, when not using MotionAI, the Envy always sets the outgoing frame rate to match the incoming frame rate. For instance, a movie playing at 23.976Hz would be output to the display at 23.976Hz. However, when using MotionAI, the Envy needs a higher frame rate than the source, to create room for the additional interpolated frames it adds.

When using MotionAI, you can choose your desired output framerate, based on considerations as explained here. The ideal framerate to use depends on several factors, including the strength of the MotionAI you prefer to use, which model of the Envy is being used, and how many other concurrent algorithms you wish to run. However, some displays have limited options for the framerate they can accept, so the display's capabilities can be a limiting factor.

#### 3.0.1.1 MotionAI With All Displays Supporting 100Hz and 120Hz

When using MotionAI with displays that support HDMI 2.1 with 4K120 support, such as most modern flat panels, large "walls", and the JVC NZ series projectors, using an output framerate of 120p is a great choice for incoming signals with 24p and 30p, and required if you wish to use MotionAI with and 60p sources. Using an output framerate of 120p should also result in fewer motion artifacts than using 60p. Similarly, displays that support 120Hz usually support 100Hz, which is required if you wish to use MotionAI with 50p sources.

However, if you prefer stronger (smoother) motion handling with the highest levels of clarity and detail - in exchange for higher levels of soap opera effect - and do not mind a few more occasional motion artifacts - then using an output framerate of 60p for 24p sources can provide slightly stronger motion handling. However, this may not be worth the listed tradeoffs, compared to using 48p or 120p. Therefore, experimentation is recommended.

In many cases, using MotionAI at 120p will be the first time a system has sent 120p to the display. Note that to use 120p output, you must have a certified HDMI 2.1 48Gbps rated cable. Therefore, if you experience flickering or other such HDMI issues with your setup, please try with a proper cable, or use 60p instead.

**Note for JVC NZ projector users:** You must select the "EDID A" option in the JVC menu and have a HDMI 2.1 certified cable between the Envy and the JVC. Also, please turn off JVC e-shift because it reportedly has some challenges with 4K120. Please also turn off JVC CMD and ideally enable low latency mode, but that is optional.

#### 3.0.1.2 MotionAI With Displays Supporting 48Hz (Barco, Christie)

Some displays, notably those from Barco and Christie, do not support 120Hz, but do support 48Hz. Using 48Hz for 24p sources is a great choice, for reasons mentioned in Section 3.0.1.1, with nearly identical results to using 120Hz for 24p sources. Note, however, that such displays cannot support MotionAI with 50p or 60p content, since they do not support 100p or 120p input signals.

Note also that the JVC NZ series projectors are capable of 48Hz input. However, there is no real benefit to using this mode over 120Hz with the JVC NZ line, and doing so complicates the HDMI signal chain and has some other quirks and drawbacks with the JVC we have encountered. Therefore, for the JVC NZ series, we recommend setting the framerate to 120p – unless you prefer stronger MotionAI, as discussed here.

### 3.0.1.3 MotionAI With Displays Supporting 60Hz

All modern displays support 60p input, and therefore it is a great option if you do not have a display that supports 120Hz or 48Hz. However, even if you do have such a display, you might still prefer to use 60p for 24p sources, because doing so provides the option to use MotionAI at slightly stronger levels, if desired.

### 3.0.1.4 Which Output Framerate Is Best for Me?

Choosing the right output framerate can significantly impact your MotionAI experience. The following information should help you make the most informed decision on which output framerate to select. If your display does not support 48Hz or 120Hz, the only option is to run MotionAI at an output framerate of 60p. However, even though 48p and 120p may have some advantages, 60p still produces exceptional performance.

MotionAI offers various settings for you to customize the strength and “look”, ranging from a light application that counteracts motion blur in sample-and-hold displays, to maximum strength for extreme smoothness and clarity, along with a pronounced soap opera effect.

If your display supports 48Hz or 120Hz, then you gain even greater flexibility and control. Advantages of using 48p or 120p output with MotionAI include:

- Fewer motion artifacts at higher strengths, compared to 60p. And as you lower the strength, artifacts become increasingly rare.
- The GPU load on the Envy is considerably lower, providing extra headroom to run more Envy algorithms and features simultaneously and or at higher quality levels.
- The strength levels are more uniformly spaced, allowing multiple consistent steps between the lowest and highest MotionAI strength settings.
- The cinematic appearance can be better preserved without requiring blur settings, potentially yielding an even cleaner image. For instance, you may find that using Very Low or Low, without Blur, at 48p or 120p, provides a more pleasing image than when using 60p, which generally requires higher blur settings to achieve the same look.
- With 120p, you can seamlessly switch between 24p and 60p content without the Envy and the display needing to resync the HDMI connection to a different framerate.
- Please keep in mind that using a 60p framerate, however, may deliver slightly higher levels of clarity and fine detail, for those that prefer stronger settings with more smooth motion (less cinematic, more “realistic” images).

In summary, using 48p or 120p as your output frame rate with 24p content might be the optimal choice if you prefer lighter strengths of MotionAI and your display supports these resolutions. Otherwise, using 60p is great as well.

### 3.0.2 Configure the Incoming and Outgoing Framerates

**Outgoing Frame Rate:** When enabling MotionAI, the Envy will automatically select an appropriate output framerate. However, based on the above discussion, you may instead wish to force your preferred output framerate. This is done in the Envy Settings menu, by manually setting the “Output Frame Rate”.

**We highly recommend you manually set your preferred framerate and save it to your Base Settings or to the MotionAI profiles from Section 2.0, instead of relying on the Auto setting. Otherwise, you will not be able to use the instant full-screen A/B comparisons discussed in Section 4.0 and 5.0. This may be changed in a future Envy firmware update. Also, this puts you firmly in control of your preferred frame rate, after considering your options.**

We recommend storing these settings in the “MotionAI On/Off” profile you created in Section 2.0. If you want to go back to 24p for testing, or permanently, simply deactivate this profile. Alternatively, if you plan to always use MotionAI, you can save this change directly to your Base settings.

**Incoming Frame Rate:** In some cases, a media player may be misconfigured to output movies at 60p instead of 24p. Therefore, it is important to check that your media player is set to output 24p native content at 24p. For example, if using an Apple TV or Kaleidescape, be sure to configure it to output 23.976p to the Envy, as these devices are often set incorrectly to output 60p. You can verify that your sources are sending in 24p for movies by checking the Envy Incoming Signal menu, which should show the setting as 23.976Hz for movies, if set correctly.

### 3.0.3 Activating and Deactivating MotionAI

To activate MotionAI, follow the instructions in Section 3.0.2, and then select the MotionAI Profile “On” within the MotionAI On/Off Profile Group. To turn MotionAI off, select the Deactivate Profile option within this same Profile Group. Likewise, the settings discussed in this section are found in the Deinterlacing & Motion menu. Be sure to set the Motion Processing to “MotionAI”, along with the Output Frame Rate to your desired frame rate.

### 3.0.4 MotionAI Level Presets

MotionAI offers users the ability to control the strength of the motion smoothing effect. At this stage of MotionAI development we have made several intricate settings available so that you can find your ideal settings. In the future, these settings will be simplified into selectable presets, based on feedback we receive. However, a Custom option with more detailed control is still planned to be available.

#### **Recommended Levels for Use With 60p Output Framerate:**

The following recommendations for various strengths and “looks” for MotionAI should help you get started. We recommend storing these settings into the “MotionAI Strength” Profile Group created in Section 2.0. These particular settings are largely designed for use with an output framerate of 60p:

- **Low:** Model: Dragon Mouth, Strength: High, Blur Mode 3, Strength 10, Width 5. For those who prefer a more cinematic look, the “Low” preset purposely keeps most judder, while providing an overall pleasing stability to the image and keeping it fully cinematic.
- **Balanced:** Model: Dragon Mouth, Strength: High, Blur Mode 3, Strength 7, Width 4. These settings create a balanced look, removing more judder and smoothing the image more, while still preserving most of the cinematic look.

- **High:** Model: Dragon Mouth, Strength: High, Blur Off. These settings create a strong, and smoothed look. While the soap opera effect is strong in this mode, some people prefer this look due to the clarity and fine detail it reveals.
- **Insane:** Model: Dragon Mouth, Strength: Full, Blur Off. These settings create the strongest and most smoothed look. Although very strong, some users love the extreme clarity and ultra-realistic look it creates. This mode can be fun and existing particularly for use with certain content, such as documentaries, concerns, and other such non-cinematic content.

Note that the Dragon Mouth and Big models are not supported on Envy units manufactured in 2020 due to the amount of processing power required. In which case we suggest using Alpha8 or one of the Hybrid models instead, as those should work similarly. Also note that just because the Strength is set to High in these modes, it does not mean that result is strong and smooth motion. On the contrary, the blur settings in the Low and Balanced profiles preserve much of the cinematic look with lighter motion handling. A similar look can be achieved by using lower strength and less blur, so we encourage you to experiment to find the settings you like best.

### Recommended Levels for Use With 48p and 120p Output Framerates:

When using an output framerate of 48p and 120p, you may find that it is not necessary to use Blur modes to preserve the cinematic look, as required when using a 60p output framerate. This is because at 48p and 120p, the overall strength of MotionAI is lower to begin with, which is more attuned for use by those who prefer lower levels of MotionAI and minimal soap opera effect.

To create varying looks like Low, Balanced, and High at 48p and 120p, we recommend simply using the Dragon Mouth Model, and setting the strength at Very Low, Low, Medium, High, and Full, accordingly, and without Blur as a starting point for your experimentation. Note, however, that similar looks can be obtained at 60p by using motion blur, as noted in the section above, however that approach is not quite as clean as achieving a similar look at 48p or 120p. You may still want to experiment with using Blur in these modes, as doing so can increase motion resolution, as discussed earlier.

### Summary

The recommendations presented in this guide are based on feedback from early MotionAI users. There are no hard and fast rules - we encourage you to experiment to find what you like. Please be sure to let us know your favorite settings.

To make experimenting quick and easy, we recommend storing various settings into the MotionAI Strength Profile Group profiles, as created in Section 2.0.

### 3.0.5 Configuring the Remote Control for MotionAI

To help you experiment with MotionAI and its settings, we recommend using the Remote Control Configuration menu to map the colored buttons as follows.

**Green:** Assign to toggle MotionAI on and off. **Important:** Be sure to have read the red highlighted note in Section 3.0.2. If this is not taken into account, the instant A/B function will not work, and instead you will have a black screen that takes several seconds to resync, making it difficult to pick up on the subtle differences of some MotionAI modes.

**Green + hold (1 second):** Assign to toggle split screen: Mode 1 (full image, half on/off), Mode 2 (50% identical image left on / right off), and Mode 3 (same as Mode 2 except mirrored).

**Blue:** Assign to Activate Profile MotionAI Strength “Low”.

**Blue + hold:** Assign to Activate Profile MotionAI Strength “Balanced”.

**Yellow:** Assign to Activate Profile MotionAI Strength “High”.

**Yellow + hold:** Assign to Activate Profile MotionAI Strength “Insane”.

**Red:** Assign to cycle among Low, Balanced, High, and Insane MotionAI strengths.

Once assigned, store these settings into the Motion AI On profile so they persist.

Note: You must first set up the profiles as described in Section 3.0.4. Once configured and then assigned to the colored buttons, you can then instantly switch between all the various settings and looks you would like to use or experiment with. See Section 3.0.6.4 for more information.

### 3.0.6 Customizing The MotionAI “Look”

Although MotionAI can provide silky-smooth motion at higher strength levels, the removal of all judder can make the image appear too lifelike and non- cinematic for some viewer’s taste. If you prefer a more traditional cinematic look, adding motion blur, particularly when using a 60p output framerate, can help you maintain that look while still enjoying the benefits of very smooth motion provided by MotionAI.

To give you more control over the appearance of motion, we therefore offer several controls for you to set to your liking. We recommend experimenting with different combinations of MotionAI Models, Strengths, and Blur to find the optimal settings for your preferences.

#### 3.0.6.1 Customizing The MotionAI “Model”

You can choose the MotionAI Model as Alpha8, Hybrid, Hybrid v2, Dragon Mouth, Dragon Mouth v2, Big v3 and Big v4. Some of these models are experimental and may be removed or replaced with newer models in later firmware updates. Eventually the Envy will automatically select the ideal MotionAI model for you, based on your Envy model and your other settings and preferences non-MotionAI related, to help optimize its performance. However, it will allow you to manually override this setting.

The Dragon Mouth and Big models are the most sophisticated. However, these models also consume more GPU power, particularly at higher strengths and when used with a 60p framerate. There may be some scenes, however, that perform a bit better with a different model, or show an artifact with one model but not another. For instance, you may find that a certain scene has an artifact with Dragon Mouth, but not with Hybrid v2. And vice versa with a different scene.

So, it is very much a process of give and take, and finding the best overall model, all things considered. You can, however, use profiles to select the desired model based on your preference for the content being watched. We encourage you to test the different Models and find the ones you prefer.

#### 3.0.6.2 Customizing The MotionAI Model Strength

For each model, you can also select the strength. The higher the strength, the smoother the image. The lower the strength, the more judder is retained. Therefore, lower strengths will provide a more cinematic experience (particularly



when used with a 48p or 120p output framerate), while higher strengths provide a more lifelike image with extra-fine detail and extreme clarity/

### 3.0.6.3 Customizing The MotionAI Blur

Adding motion blur helps to preserve the cinematic look by dynamically adding blur to faster moving parts of the image, while still improving the judder of 24p. You can also choose from Blur Mode 1, 3 and 4 or choose to use no blur. With Blur Mode 3 and 4, you can also specify the strength of the blur and the “width” of the blur. The higher the strength, the more cinematic the image. And the lower the strength, the more crisp, clean, detailed, and lifelike the image. Lastly, the wider the blur (controlled by the Width setting), the more impact the blur setting has. As mentioned elsewhere, you may not need any blur, or smaller amounts of it, when using an output framerate of 48p or 120p.

Although it may seem counterintuitive, applying blur can actually improve motion resolution. For example, consider rivets on a bridge that have some judder when not using blur. However, when blur is applied, the movement can become smoother and easier for your eyes to track, and therefore be perceived as being sharper.

As you can see, combining the MotionAI Model, with its overall Strength setting, and optional Blur Mode, varying the Strength and Width of the blur, and varying the output refresh rate (if your display supports 48p and or 120p) allows for virtually unlimited experimentation and customization of the look of MotionAI. There are multiple ways to achieve a similar look. For instance, using a lower model strength, without blur, may produce a similar look to using a higher model strength with blur, but with subtle differences that may prefer one way over the other.

### 3.0.6.4 Tip: Save Your MotionAI Settings to Profiles!

A very powerful way to experiment and perform A/B testing to find your favorite MotionAI settings, especially if customizing settings, is to save your settings to Profiles in the Envy. Then you can use the new “Activate Profile” or “Cycle Profile” actions in the Remote Control Configuration menu to recall your favorite settings or even cycle through multiple settings with the press of a single button on the Envy remote.

## 3.0.7 MotionAI Split-Screen Modes

MotionAI also supports multiple split-screen modes that are great for A/B testing. In the first mode, the left side of the image is shown with MotionAI, and the right side is shown as 24p. In the second mode, the middle 50% of the image is shown on both sides of the screen, with MotionAI only active on the left. There is also a third mode, that is the same as the second, but mirrored. See section 3.0.5 for information on how to toggle between the split-screen modes.

### 3.0.8 Tip: MotionAI with the Kaleidescape UI

The Kaleidescape UI and its animations, such as the cover art shuffling, is a staple of the A/V industry and beloved by many. However, to look its best requires running the Kaleidescape UI at 60p, while having it set to play movies at 24p. This difference in frame rate caused a noticeable HDMI handshake delay in most setups, both when going from the UI to the movie, and from the movie back to the UI.

However, with MotionAI, you can have your cake and eat it too. Simply set the Kaleidescape UI at 24p (“Prefer 24 Hz onscreen menus”). Then create an “Incoming Flag” profile in the Envy that is triggered by the flag “Kscape menu”, and have that profile use Model: Dragon Mouth, Strength: Full, Blur: Off. Using this approach, the Envy will automatically apply these aggressive, full strength MotionAI settings only when the Kaleidescape UI is active. This gives you smooth

animations, without the judder and jerkiness of 24p otherwise. Then when a movie is played, the Envy will then turn off this profile, since the UI is no longer present. This way you have the strong settings automatically applied only when the UI is active.

## 4.0 Techniques for Evaluating MotionAI

To get the most out of MotionAI, it is important to understand the MotionAI options, which types of scenes are best to test with, and what to look for when evaluating the scenes. For example, scenes with a lot of motion, whether fast or slow, are ideal for evaluating MotionAI. But even scenes with little movement can benefit from the clarity and stability it brings.

When evaluating MotionAI, we recommend experimenting with different MotionAI presets and multiple customized settings to find what works best for you. Also, the use of both full-screen and split-screen modes is highly recommended during your evaluation. In full-screen mode, toggling MotionAI on and off for the entire image allows for a quick comparison of the difference in image clarity and stability. For fast-motion scenes, try toggling MotionAI on and off every few seconds to see the impact it makes.

The split-screen comparison modes are also highly effective. In the first mode, where only the left side has MotionAI activated - as the panning image passes through the split-screen dividing line, watch as MotionAI magically removes the image flaws and “purifies” the image. Lastly, using the second split-screen mode allows you to compare the exact same portion of the image concurrently with and without MotionAI.

Try toggling MotionAI on and off even in scenes with little motion. Observe how fine details, such as pores on a person's face, remain clear with MotionAI activated, and how they may weaken with even slight movement when MotionAI is off.

As a reminder, information on how to toggle MotionAI on and off, and how to change its strength and motion blur options, are covered in section 3.0. In the next section, we list specific examples of scenes that are well-suited for evaluating MotionAI and explain how to best use the comparison modes in your evaluation.

**Important:** When evaluating MotionAI please make sure that you have turned off any motion interpolation features in your display.

## 5.0 Popular Scenes for Evaluating MotionAI

This section provides a list of popular scenes that are ideal for evaluating MotionAI's performance and for making A/B comparisons. By using these examples, you can easily see how MotionAI enhances image clarity, stability, and detail, providing an immersive video experience. Refer to section 3.0 for instructions on how to turn MotionAI on and off for both full-screen and split-screen comparisons, how to control the MotionAI strength and motion blur options, and how to ensure that your media player and your Envy are setup as required for use with MotionAI.

Note that if using an output frame rate of 60p (see Section 3.0.1), the 24p experience in the A/B instant full-screen and split-screen comparisons is provided using Envy's Frame Blending feature (see Section 8.0). Otherwise, if using an output framerate of 48p or 120p, then the A/B comparisons do not use or require Frame Blending. Frame blending can slightly enhance or slightly detract from the quality of 24p on certain displays, possibly making it look a bit better or worse than how 24p looks in your theater.

We recommend using these instant full-screen and split-screen modes for most of your comparisons, or at least starting this way, because it makes comparisons instant and easy. However, if you are using an output frame rate of 60p and want exact 24p vs. MotionAI comparisons, you will need to deactivate the MotionAI Profile, or manually change the Envy Output Frame Rate from 60p to 24p. Then reverse this to go back once again to using MotionAI. Keep in mind that if you do comparisons this way, you won't be able to use the split-screen and instant full-screen comparisons, because switching between MotionAI on and off will take several seconds as the HDMI signal needs to resync. Nonetheless, viewing your favorite sequences with this type of comparison may give you an even greater appreciation for MotionAI's benefits.

Note that if using a 48p or 120p output frame rate, then Frame Blending is not used, and the results from instant full-screen and split-screen comparisons are the same as if switching back to native 24p. This is because at both 48p and 120p output, the comparisons are simply achieved by repeating the same 24 fps frame one time (for 48p) or four times (for 120p).

After evaluating these scenes, you may find yourself re-watching these entire movies like never before with MotionAI!

#### **5.0.1 “Ready Player One”: 00:11:55 – 00:16:56 (Car Race)**

To evaluate MotionAI in this scene, we recommend using the full-screen comparison mode. Start at 00:11:55 with MotionAI on and watch how smoothly the car animates as it is built after Wade throws his keys on the ground. Then jump back and watch the same section with MotionAI off, before trying again while toggling MotionAI on and off every second or two.

Next, compare how things look with and without MotionAI as Wade enters the car and the camera pans from the side to the front, from 00:12:10 to 00:12:16. Then, watch the entire car race scene through 00:16:56 while toggling MotionAI on and off quickly.

Finally, sit back, relax, and watch the entire scene with MotionAI on. Despite how many times you may have watched this scene before, we guarantee you'll enjoy it like never before with MotionAI!

#### **5.0.2 “Ready Player One”: 00:44:20 – 00:49:15 (Dance and Battle)**

Toggle MotionAI back and forth while watching this scene. Then watch the scene again with MotionAI on. Like with the Car Race scene above, we believe you may be in awe of the highly immersive picture quality that MotionAI delivers.

#### **5.0.3 “1917”: 01:02:17 – 01:02:27 (Tree Panning)**

This scene is great to evaluate using both full-screen and split-screen comparison modes and hardly needs any explanation. Try it one way and then the other. Watch how the trees and landscaping along the upper half of the image judders like crazy with MotionAI off and the improvement with MotionAI on.

#### **5.0.4 “Coco”: 00:04:11 – 00:04:47 (Marketplace)**

Watch with MotionAI on at the start of this scene in full-screen comparison mode. Notice how smooth the camera pan is, as it moves backward, away from the table, and how smoothly the column comes into view. Repeat with MotionAI off.

Next, with MotionAI off, observe as Miguel exits the shop and runs down the street towards the market, continuing until the dog falls out of the trash can at 00:04:39. Notice the significant amount of judder along the walls and with the mariachi band, as well as the distortion this causes to the guitar and to the marketplace table as it pans by. Then, go back to where Miguel exited the shop and watch this part again but with MotionAI on. Observe the massive improvement in image stability and clarity.

Try repeating the same scene but this time while toggling MotionAI on and off every few seconds throughout the clip. Afterward, switch to split-screen mode and watch how the dividing line magically erases the 24p artifacts and purifies the image as the content pans across the dividing line.

Please be aware that this scene is currently affected by the pixelation issue covered in section 6.0.2. We are actively working on a resolution and hope to have it fixed soon.

### 5.0.5 “Aquaman”: 01:21:38 – 01:33:38 (Marketplace and Roof Top Chase)

This scene is a goldmine for MotionAI demo material. Start with the beginning of this scene, with the “fly in” over the water until you see Mera get out of the pickup truck. Go back and forth, comparing these pans with MotionAI on and off. Skip ahead to 01:25:21 and compare the panning in the cliffs and into the “battle circle”.

Then at 01:56:25, watch as Black Manta arrives - this entire sequence is ideal for testing MotionAI using the same techniques covered earlier. From 01:28:18 to 01:28:51, there is a lot of panning and spinning where the benefits of MotionAI really shine. Another exceptional sequence to evaluate is the roof top chase from 01:30:12 to 01:30:46. Try watching in full-screen mode and toggling MotionAI on and off quickly as the villain runs through the walls. Don't miss testing the "spin" at 01:30:40 with MotionAI on and off!

### 5.0.6 “Deadpool”: 00:00:40 – 00:09:10 (Opening Scene)

Start by watching the opening credits from 00:00:40 to 00:02:26. This sequence features several slow pans which exhibit significant judder at 24p. Toggle MotionAI on and off in full-screen mode, then watch it again in the first split-screen mode to see the judder removed by MotionAI as the content passes over the dividing line. We also recommend watching with the second split-screen mode as well.

Next, skip ahead to 00:07:06 and watch the action sequence in full-screen mode, toggling MotionAI on and off until it ends at 00:09:10. You'll notice a significant improvement in clarity and stability with MotionAI turned on. You may find the second split-screen mode also effective.

### 5.0.7 “Lucy”: 01:15:32 – 01:15:47 (Chair Spin)

Among many great scenes in Lucy, this clip stands out for MotionAI testing. Watch as Lucy sits on the spinning chair as it passes by cliffs and over the water, first with MotionAI off and then with MotionAI on. Then watch again in split-screen mode.

### 5.0.8 “Sonic 2”: 00:54:10 – 00:56:25 (Snowboard Chase)

While Sonic 2 may not have the most captivating plot, it boasts impressive HDR video and Atmos audio quality with exciting action sequences, making it a prime candidate for showcasing MotionAI. In full-screen mode at 00:54:10, watch

as Sonic is chased. Quickly toggle MotionAI on and off to observe the unstable and jittery image when off, and the transformative effect of MotionAI when on.

To fully appreciate the benefits of MotionAI, we recommend testing this scene with your display's motion interpolation and comparing it with MotionAI. With its advanced AI-based technology, MotionAI can provide superior handling of fast-moving particles and objects in this action-packed scene, resulting in clearer and smoother motion.

### 5.0.9 “The Greatest Showman”: 00:00:00 – 00:02:55 (Opening Scene)

Toggle MotionAI on and off as P.T. Barnum walks past the two sets of bleachers at the 00:01:09 mark. Also try this with split-screen mode 2. Continue watching as he performs for the audience. Then pay particular attention starting at the 00:02:03 mark, as the camera pans while the characters are dancing and twirling. Continue watching until the scene ends with the slow plan of P.T. Barnum as a child, seeing himself in the window. Use both full-screen and the split-screen modes for these parts as well.

This is an excellent scene to look for your preference for a lifelike vs traditional cinematic look, particularly during the dancing and twirling referenced above. If you feel the action here is too lifelike for your taste, try the motion blur modes and see if the movie then looks cinematic to you again, while retaining the smooth motion. If after adding the motion blur you feel the image is too lifelike, try a lower MotionAI strength.

### 5.0.10 “Baby Driver”: 00:06:30 – 00:09:15 (“B-A-B-Y Baby”)

We invite you to take a closer look at one of the most judder-filled scenes presented in this section. In this scene, Baby strolls down the street, offering a treasure trove of opportunities to test judder. By toggling MotionAI on and off while watching in full screen, and rewatching using split-screen mode 2, you can easily evaluate the full range of motion handling options available to you using MotionAI. Even the biggest proponents of 24p may be surprised by the results and reconsider their preferences.

While judder occurs in throughout this scene, we have selected a few specific moments to pay particular attention to:

- Judder in the vertical pan of the building at the scene opening.
- Detail in the small bushes at the side of the street, just before the rollerblader.
- Camera pan and spinning, along with Baby pan and spinning around the light pole, right after the rollerblader.
- The blue mailbox has a sticker with the word “SCRATCH”. With native 24p, it is nearly impossible to read this word, which is timed with the soundtrack. With MotionAI, you can easily see the word, even at low strengths.
- Judder in the wall mural as Baby salutes.
- Judder and blur level of the woman who’s back is to the camera, at the bank machine.
- Judder with the construction worker with the orange and yellow vest.
- Judder with the two businessmen walking out of the building. [Fun fact: While it looks like the actors missed their cue to exit the doors, the delay in their movement was reportedly intentional.]
- The coffee shop segment features two excellent slow pans – one in each direction.
- Watch the zoomed-in coffee cups at the 09:10 mark. With MotionAI off, notice the far-excessive blur of the cups as they bob up and down as Baby walks. Watch the cups again with MotionAI on to see more realistic movement, and check with and without motion blur added, to help evaluate your preferences for motion blur.

## Section Summary

In this section we covered specific scenes that are perfect for evaluating MotionAI's performance, including how to adjust MotionAI based on your preference for a lifelike vs cinematic look. The section also showed how to make effective A/B comparisons, both in full-screen and split-screen modes. By evaluating these examples, you can easily see how MotionAI improves image clarity, stability, and detail, providing a truly immersive video experience. Further, this section should help you understand how to best evaluate other content.

As you discover any great demo scenes of your own, please feel free to email us at [motionai@madvr.com](mailto:motionai@madvr.com) with the movie title and timestamp to share your recommendations with us!

## 6.0 Acclimating To MotionAI

It is important to keep an open mind and reserve judgment on how much you like MotionAI overall and what your preferred settings are until you have spent a fair amount of time experimenting with it. Everyone has their personal taste when it comes to the look they prefer, whether it's a more cinematic or more lifelike appearance. For some people, the experience of MotionAI can be an acquired taste, much like developing a taste for a new food or drink.

You may find that initially the higher strength settings make the motion appear too smooth and lifelike and prefer lower strength MotionAI settings. You might also find that you prefer different MotionAI settings when watching different types of content, such as animation, sci-fi, drama, and action movies. Or enjoy it more with content that has more film grain. Therefore, it's important to spend some time acclimating to the various looks of MotionAI and experimenting for the first few months to decide on your preferences.

## 7.0 Known Issues and Limitations

At this point, all known issues with MotionAI have been resolved, except as detailed in this section. Please keep in mind that the software is still in beta.

**7.0.1 Rare artifacts:** On rare occasions you might find some "break up" where a small portion of the image seems to shift out of place or flicker for a brief moment. This should be a rather rare occurrence, overall. If the artifact is bothersome or frequent in certain types of material, try using a different MotionAI model or switching from an output framerate of 60p to 48p or 120p, if your display supports it. Artifacts using 48p and 120p are rarer, particularly at lower strengths.

## 8.0 Feedback Please

We value your opinion on MotionAI and would love to hear your impressions. Your feedback can help us continue to improve and provide the best possible video experience. We are particularly interested in hearing what your preferred MotionAI strength and motion blur settings are, and understanding the extent to which you feel MotionAI enhances the picture quality and improves your viewing experience.

Whether you have any suggestions, feedback, or simply want to share your experience with us, please email us at [motionai@madvr.com](mailto:motionai@madvr.com). Similarly, if you encounter any issues, please refer to section 6.0. We appreciate your feedback and look forward to hearing from you.

## 9.0 Frame Blending and Its Role in Evaluating MotionAI

If you are wondering how the Envy can show the difference between MotionAI running at 60p Vs 24p, without changing the framerate from 60p, this section explains it. The Envy uses a technique called Frame Blending, which simulates the look of 24p content while running at 60p. This allows for instant toggling between MotionAI on and off, as well as split-screen views with MotionAI activated on one half, and off on the other, without the need for HDMI handshakes that cause delays and make comparisons more difficult and time consuming.

Frame Blending was originally developed to improve the rendering of 24p content on displays with inadequate 24p support, but in this use case it is highly valuable for evaluating MotionAI. It enables seamless comparisons between 24p and MotionAI, without having to change the Envy Output Framerate between 24p and 60p. This is because framerate changes cause HDMI handshakes that can last several seconds, making comparisons more difficult.

However, it's important to note that using Frame Blending to show 24p content at 60p may be more, or less, flattering to 24p than how 24p looks, since Frame Blending was originally designed as a poor-man's-native-24fps-mode for displays which didn't support 24p at all or did so rather poorly. To observe the true look of 24p on a display, it is necessary to switch the Envy Output Frame Rate setting back to 24p. After evaluating 24p, switch back to 60p to use MotionAI again.

However, if using an output framerate of 48p or 120p, then Frame Blending is not used in the comparisons, and the results of the "MotionAI off" comparisons should be the same as with native 24p. See the beginning of Section 5.0 for more information.

In summary, Envy's Frame Blending feature enables easy A/B comparisons between MotionAI on and off, without the need for HDMI handshakes. However, to observe 100% of the true look of 24p on a display, it is necessary to switch the Envy Output Frame Rate setting back to 24p when using an output frame rate of 60p. But this is not necessary when using an output frame rate of 48p or 120p since Frame Blending is not needed or used in those comparisons with this framerate.

## 10.0 Conclusion

In this guide, we introduced MotionAI, a groundbreaking AI-based motion processing technology from madVR Labs that enhances the viewing experience of video content. MotionAI offers unparalleled improvements in image clarity, stability, and detail, providing a truly immersive video experience.

We discussed how MotionAI works, its key features and options such as strength and motion blur, and how to use it effectively. Additionally, we provided a list of popular scenes that are well-suited for evaluating MotionAI's performance, along with specific instructions on how to make effective A/B comparisons. We also covered known issues and how to report any issues you find, as well as the role of Frame Blending in evaluating MotionAI.

We also briefly mentioned how modern displays use sample-and-hold technology that can introduce unintended motion blur and artifacts that are not as the director intended. For more information, see [this article](#).

Please be sure to send feedback on MotionAI or this guide to [motionai@madvr.com](mailto:motionai@madvr.com). We believe MotionAI is revolutionizing the way we watch video content while providing the most immersive cinematic experience. We thank you for coming along on this journey with us!