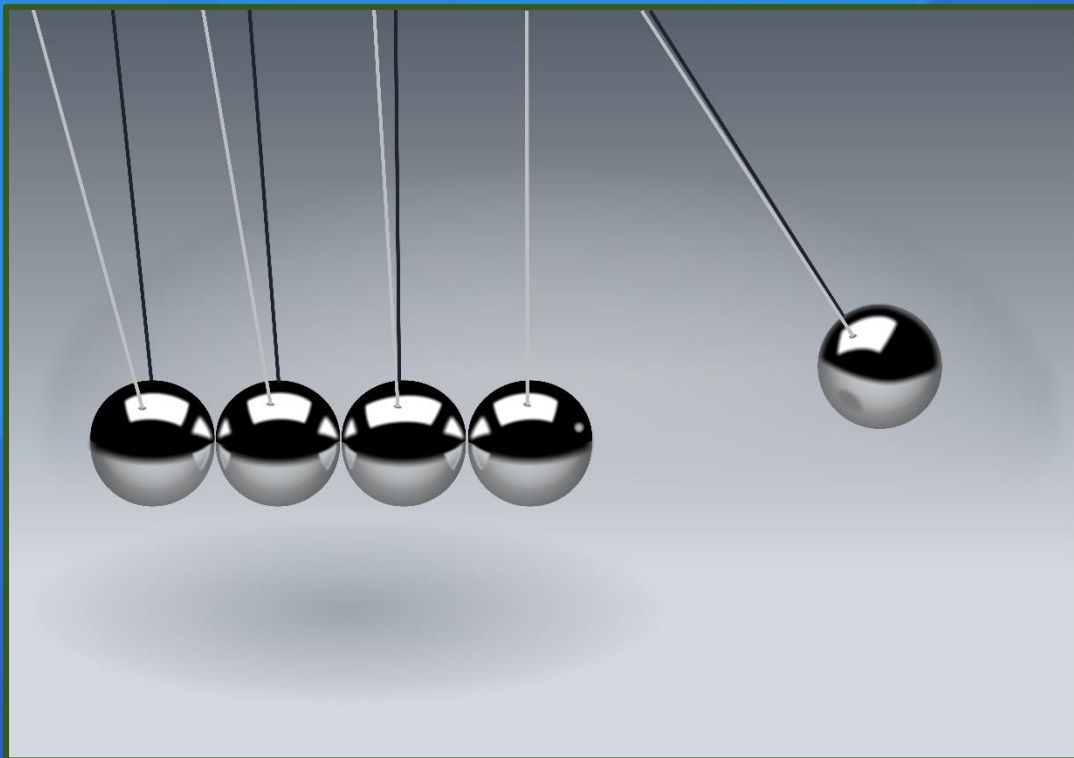


Video conversion part 1

Introduction to frame rate conversion



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“FRAME RATE – AND WHY IT MATTERS?”

When we watch a movie, a television broadcast or a video stream via our mobile devices we are presented with a series of pictures (*or frames*) in quick and regular succession. We commonly describe the rate of presentation in frames per second (*fps*).

You may also hear frame rates also specified in Hertz (*Hz*) but this is only technically true for progressive formats. For interlaced formats, where a frame consists of two sequential interlaced fields - then the frame rate is half of the given frequency. We will look further at converting between interlaced and progressive formats later in this series.

Effect of different framerates

Most would agree that when we view higher frame rate content i.e 50/60 fps - our analogue eyes/brain combination perceives a more continuous and smoother motion than for lower frame rates.

So why don't we just shoot everything at a higher frame rate?

Much of this is about history and how frame rates have evolved. For example, cinematic features still tend to be shot at 24 fps mainly for artistic reasons as this is the “look and feel” the cinema audience have come to expect.

We should also consider that in digital content chains, there is a direct relationship between frame rate and the amount of data to process and move around. Frame size, resolution and compression are also part of this equation.

The key point is that there are many different frame rates in existence - some standard and some non-standard. You may be in a position to choose your ideal frame rate or you may have to handle the situation based on what you are given.

Which standard frame rates are you likely to meet?

Different standards have been introduced over time but usually the content production, post and distribution teams only need to worry about a handful of frame rates - traditionally 23.98, 24, 25, 29.97, 50, 59.94 and 60 Hz. If we could acquire, produce and deliver at the same *and only the same* frame rate then this would be all be quite straightforward - but this is rarely the case.

Within a project there can be many sources at different frame rates which need to be combined. Even when normalized to a master frame rate the final program may still require many multiple frame rate versions for different target audiences. The most obvious examples are live events and breaking news, where the originating content needs standards conversion for international broadcast. It is important that your equipment and applications can handle conversion requirements as they arise.

What are examples of non-standard frame rates?

Non-standard frames and how you might handle them presents an additional challenge. This can happen when integrating user generated content or content edited by less experienced production houses, where projects may have been set up using approximate frame rates. It's remarkably common to discover content at exactly 23.98, 29.97 or 59.94 Hz, whereas in fact the standards for these fractional frame rates are 1000/1001 multiples of integer numbers i.e. 24/1.001, 30/1.001 and 60/1.001.

Lower frame rates (<23.98 Hz) can also be found in various scenarios e.g. certain animations, CCTV material (not all systems follow the professional broadcast standards), and content captured on some older mobile phones.

Any producer wanting to integrate archive footage into a production will be very aware of non-standard frame rates. Archive footage can be anything from 14 to 22 fps. Hand-cranked film can be variable frame rate, but mechanically cranked films are often 16 or 18 fps. Such film may have undergone an earlier transfer to 24 fps which may have had the effect of speeding up the motion, and careful processing may be needed to revert to the original frame rate.

High frame rates (>60 Hz)

Higher frame rates can be found in more modern material. For example, your source content may have been shot at 100, 120/1.001 or 120 Hz. Content originally shot or produced for integration into computer games might be 75, 90, 100 or 120 Hz.

In summary, there are many frame rates out there so when choosing a professional conversion product, make sure your solution (such as FrameFormer from InSync) is unrestricted in the range of frame rates it supports and allows a user-definable frame rate, so that you can include any material into any project.

Techniques for frame rate conversion will be introduced in the next blog: Frame Rate Conversion Part 2. Follow the InSync Technology linked-in company page and you will be notified when it is published

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