



Five Steps for Building Transcoding into Your Workflow

Video producers in the broadcast, film and video production, and web publishing industries are seeking new ways to increase visibility and income from their videos. But each additional revenue opportunity imposes different operational requirements, including new playback software or hardware, delivery platforms, video formats, and other customizations. In some cases, device interoperability will allow the reuse of existing versions of content without transcoding. But with the hundreds of formats and variants in existence today, the majority of video files must be transcoded before submitting them to the chosen recipients.

There are a wide variety of factors to consider when bringing transcoding into your workflow. A video workflow may be as simple as converting a file to the right format and delivering it. Or it may be much more complex, involving automated processes from ingest to asset management, asset management to editing, editing to various distribution points, and so forth.

But whether the transcoding project is simple or complex – the same questions are relevant. Which format should I use at each step in my workflow? Which wrapper? What settings? When should I switch from a high quality format to a low quality one? Let's examine some of the technical and procedural considerations you should think about while trying to answer these questions:

- **How can I ensure my files will be compatible with different devices?** First and foremost, you must consider device compatibility. This is the whole point of transcoding, making video files that work on the devices or systems you want to support. But even within a video file specification – and especially within broad specifications such as MXF, QuickTime, or Transport Stream – any given system or platform will only support a subset of the full specification. The reason is simple: hardware has limitations, software typically has either limitations or bugs, and from device to device these limitations will be different. You can't simply assume an "MXF-compatible device" will magically work with all other MXF-compatible devices. You must consider and test device compatibility before designing your transcoding workflow.
- **What information do I need to keep?** Once you know what format you need, you should evaluate which information you really need to preserve. For some edit workflows, timecode and metadata are very important to the editing tasks. For other workflows, caption preservation is essential. These details can make or break a video workflow and must be addressed as early as possible in the workflow design process.
- **How will my video file be used?** Regardless of your device, different types of video formats are suited for different things. Will your file be used for editing or for transmission? You need to determine how your files will be used before developing a transcoding workflow.
- **How will the chosen format affect video quality?** There are other format nuances to consider when designing your workflow. For example, consider a video being transmitted at a constant bitrate (CBR). Typically, CBR files will have "buffer windows" – the period of time during which they guarantee a given bitrate. This window is used to let the player know how much pre-roll (the time between clicking the play button and having the video start) needs to be loaded before playback. Typically transmission methods, end-user experience, or both will determine how much pre-roll is acceptable.

However, while a short pre-roll may seem like a desirable thing, it is not always the best solution. Take for example a video where the first second of video is not very complex, perhaps a still frame. But the next second is very complex, like water splashing. The challenge is the encoder must respect the buffer window when encoding! Ideally, the encoder would use some leftover bitrate from the first second to do a good job encoding the second. This will have a direct effect on video quality and can result in dropped frames.

As you can see, subtle encoding nuances can have a dramatic effect upon video quality. It is worth considering both your format specifics and the type of content you are dealing with when considering your transcoding workflow design.

- **How fast is my network and how much storage do I have?** High quality, editable files are big. You need to understand your file storage limitations and network constraints. Try to pick an archival format that can be read by as many devices as possible. This will ensure that in ten years you won't be stuck with files you cannot read. Also make sure the video is an appropriate format for how you are likely to use it.



- **How many generations of content exist between start and finish in my workflow?** Videos are typically compressed using “lossy” algorithms, which compress video by losing information the eye cannot detect. Every transcode will introduce some loss to your original. The goal is to shorten the path from original to output in all cases. Use original footage directly whenever possible to create final products, rather than having multiple generations of material.
- **Do I need the highest quality or an automated workflow?** To get the highest possible quality, you will have to encode everything by hand. Craft encoding software will give you granular control over settings and time-based compression statistics – provided you have someone who knows how to use it. If not, or if you are dealing with a high volume of content, you can set up an automated workflow. The vast majority of televised and web-enabled content is transcoded in this way. This method works because most video formats and workflows have enough bitrate or smart enough tools to maintain high quality through an automated process.
- **What video file formats am I likely to receive?** You need to think outside the actual function of transcoding to examine your incoming content. With thousands of devices, phones, edit systems, cameras, and other sources of video, you want the flexibility to support a wide variety of formats if you are planning to accept user-generated content or content from a variety of sources.

Getting Started: Five Steps for Creating an Efficient Transcoding Workflow

Once you have answered all of the questions in the previous section, the following five steps will facilitate the development of an effective transcoding workflow:

- Step 1. Test Device Compatibility.** Review the devices you plan to use and what formats they support. Test compatibility between devices directly and identify any necessary conversions. If you haven't chosen devices yet or can't test them, use the most commonly supported format.
- Step 2. Test Various Transcoding Solutions.** You need to evaluate a range of possible transcoding solutions from plug-ins to full enterprise solutions. This will give you a sense of what is available, what functionality the tools provide, and how easy the solutions are to use. It is also essential to test these solutions with your own devices.
- Step 3. Review What Needs to Be Preserved at Each Step.** After choosing a transcoding solution, review your workflow to determine what information you need to preserve between each step. Do you need to keep timecode between your camera and your edit bay? Do you need to crop black and perform inverse telecine before delivering? If so, review your content and tools to make sure you can accomplish these tasks as efficiently as possible.
- Step 4. Pick Your Formats and Settings.** Finally, choose your formats, tools, and settings. There are a variety of ways to check quality, but the most important thing is to find representative content for quality testing.
- Step 5. Test Early and Often!** Once you have deployed your transcoding solution, you need to test the entire ecosystem. Driver changes, version updates on devices or platforms, and any changes to your devices may introduce incompatibilities. Make sure you test early and often to ensure that lack of interoperability does not halt your workflow.

Summary

In an ideal world, transcoding can be as simple as converting the original audio/video format to another audio/video format. In a few rare cases, it is that simple. But for the vast majority of cases, transcoding is much more complicated. With careful planning and a logical, step-wise approach, you can design and implement an optimal transcoding workflow.