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Video Codecs and Containers

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The type of video you record, how it is edited and the format it is output to makes a big difference. These all affect the quality of the image, the size of the file, the frame rate it can manage and the software and hardware it will be used on and also how quick it is to compress and decompress. Some file types will take a lot of processing power to encode and therefore files are slow to render when being saved but will play back perfectly quickly and at high quality.

Compression

Compression is the process of reducing file sizes to make them manageable. See the article on Compression (http://www.sdfm.org.uk/KnowledgeBase/kb.php?controller=pjLoad&action=pjActionView&id=3) for more information.

So what are they:

Formats

File extensions to some extent reflect the file formats. These can be things like .mov, .mp4, m4v and others. Unlike image files, where a .jpg is simply a JPEG image, video file formats are a combination of a CODEC and a Container.

CODEC is short for enCoder-DeCoder and refers to how the video information is stored inside the file. The type of CODEC used will determine the factors above, such as file size and quality.

A **Container** is a wrapper which enclosed all the video and audio file information as well as meta data, sub titles and timing information.

It is the Container which gives the file its , (MP4, MOV, AVI etc). Some examples of Formats and Containers are below:

Formats		Containers	
H.264	The nmost common format for recording and delivering content	MOV	Good for final output
H.265	Newer format with 25-50% better compression that H.264 for the same quality	MP4	Very popular for video streaming. no so good for editing
H.262	MPEG2 format with improvements over the older MPEG1	AVI	High quality but large files
PRO-RES	High quality format used for final delivery of broadcast material	MKV	Open source format with audio, video and subtitles contain is high quality format. Good aquisition and editing format
M-JPEG	Each Frame is separate JPEG image. Good format for editing	M4V	Similar to MP4 but can contain DRM copyright protection.
DNxHR	High Quality Editing format		

So what are the best formats to CODECS and CONTAINERS to use?

There re two types of compression, Interframe and Intraframe. Interframe only records the changes to the image. So if not much is happening, most of the information can be discarded and the file becomes very small. However if there is a lot of movement, either the quality has to reduce or the file size has to increase.

Intraframe is where each frame is compressed individually, like a set of separate jpef photos. Infact MJPEG was exactly that.

Intraframe compression is best for editing, so if you are going to edit your video one shot, choose an Intraframe codec. Once edited and you need to output, use an interframe codec as this will make the file size smaller whilst retaining quality.

By using Intraframe compression, you can quickly access each frme of the footage, which is wht it is preferable for editing.

Intraframe Codecs include MJPEG, DNxHR and ProRes. ProRes, for example ranges from ProRes 422 Proxy with 45Mb/s to Prores 4444 XQ which is 495 Mb/s.

For Interframe CODECs (i.e you final out version for upload to YouTube etc), you can use:

H264 - Very popular, very small files

H265 - Much higher quality than H264 for the same file size but rerquires more processing power

Have a look at Editor Nox's explanation:

I Started Using Editing Codecs and it Changed My Life!