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PART

Final Cut Pro in Context





1 What Makes Final Cut Pro Special?

When it was released in 1999, Final Cut Pro (FCP) was a revolutionary piece of nonlinear editing software. Since then, the software (and the hardware that runs it) has matured substantially—adding features and spawning a complete suite of postproduction tools, Final Cut Studio.

Most people who were already working in postproduction knew they were seeing something special the first time they saw Final Cut Pro. To people who have entered the business since then, FCP is an industry standard.

Why is that? Why did seasoned professionals sense a sea change in the first few clicks? How has this software thoroughly changed the industry in a few short years? What makes Final Cut Pro so special?

There is a simple answer to that question: *money*.

Final Cut Pro has consistently done more things effectively, intuitively, and inexpensively than any of its competitors. From the program's first release and through its subsequent improvements, FCP has lowered the financial ceiling on professional-quality postproduction. This chapter is about how and why this has happened.

To fully understand what makes Final Cut Pro special, why it has had such an effect on the industry, and ultimately how to get the most out of it in your own projects, we must take a brief step back and look at FCP in context.

A Brief History of Editing the Motion Picture

The invention of motion picture technology preceded the invention of editing by several years. The first “films” by pioneers such as Thomas Edison and the Lumière brothers were single shots—a passionate kiss or a parade of royalty. *The Great Train Robbery* (1903) is widely considered to be the first use of motion picture editing, as well as the first narrative film.

Cutting together, or editing, footage to tell a story is a concept and a process that is largely distinct from simply capturing the moving image. As with all art forms, the aesthetics and technology of editing have changed and will continue to change, but many of the base concepts remain the same.



The evolution of editing technology has followed a predictable path from film, to magnetic analog tape, to digital media, and finally to ever less expensive digital media and higher resolutions. Final Cut Pro represents a key link in this evolution, but mostly because it does well (and inexpensively) what editors have always been doing.

Originally, film editing was performed as a physical process—pieces of film were taped together. The resulting assembled piece of film was played back, and this was essentially the finished product. Fast-forward to the age of video, and the analogous process becomes known as linear editing. Linear editing is done with a system that consists of two videotape recorders (VTRs) and two video monitors. Like cutting film, this was a straightforward process of playing the desired clip on one VTR (the source deck) and recording it on the other (the record deck).

Over time, these linear editing systems became more sophisticated. They worked with high-quality video formats, were controlled by computers, and integrated with graphics systems (Chyron) to overlay titling on video. Still, the basic principles of linear editing had not changed: two VTRs (one to play, the other to record).

There was one basic limitation to this system, and it was a frequent frustration for editors. The problem with linear editing is that once you lay down a piece of video on the record tape, you can record over it, but you cannot move it or change its length (at least not in a single pass).

In the early 1980s, with the power of computers on the rise, a new way to edit was invented: nonlinear, or digital, editing. Nonlinear editing is based on a completely different concept: convert the video into digital files (digitize). Then, instead of editing videotape to videotape, edit with these digital files that allow nonlinear access (you can jump to any point at any time with no cuing of the tape).

Putting a new shot at the beginning of a sequence (an insert edit) was no longer a problem. With all of the video existing as digital bits, and not on a linear tape, an insert edit was merely a matter of giving the computer a different instruction or pushing a different button on the keyboard. If linear editing is like writing on a typewriter, then nonlinear editing is like a word processor.

The Big Three: DV, FireWire, and FCP

By the mid-1990s, digital nonlinear editing was common but expensive. Three related pieces of technology were introduced that together drastically changed the face of postproduction.

The first is prosumer digital video (generally referred to as DV, this implies the encoding format DV-25 and the tape formats miniDV, DVCAM, and DVCPRO that work with it). These new formats were smaller and cheaper than existing broadcast formats such as Betacam SP, but with nearly the same quality. DV is also a digital format, meaning that the camera replaced the traditional tubes with new digital chips, and the video signal that is laid down onto the tape is also digital: information encoded as bits, rather than the analog information. To really understand DV, one must realize that it refers to both a tape format (a new type of physical videotape and cassette) and a codec. “Codec” is short for compression/decompression or code/decode. It refers to any algorithm used to create and play back video and audio files. Chapter 5 is all about codecs, but the important thing to realize at this point is that the DV-25 specification that appeared in the mid-nineties had both a tape and codec component, and both were of a higher quality in a smaller size than had previously been possible.

The second technological advance was FireWire, or IEEE 1394, a new type of digital protocol used for data transfer. Somewhat similar to USB, FireWire allows faster communications with external devices than was previously possible. In fact, FireWire is



Input/Output Protocol Basics

An input/output protocol, or I/O, is more than just a cable. An I/O is really made up of three components:

1. *The Cable.* There is a lot to a cable. Besides being the right type (FireWire, component, SDI), other considerations include the length of the cable, its flexibility, strength, and price. Considerations include maximum length, signal loss, and power use.
2. *The Connections.* Once you have the proper cable type, it is important that this cable is actually able to plug in to the hardware you are using. Many I/O protocols allow various types of device connections. In the case of FireWire, there are actually three device connection types—four-pin, six-pin, and nine-pin connectors—and three matching cable connections. Before buying a cable, make sure to check which type your device uses.
3. *Transfer Methodology.* This is how the devices “talk” to each other. Transfer methodology is a necessary component of any I/O protocol, even if it may go unnoticed by many users because it is usually hardwired into the circuitry of the device you are using. In the case of FireWire, it is built right into the port and is a three-layer system:
 - a. *The Physical Layer* is the hardware component of the protocol that presents the signal from the device.
 - b. *The Link Layer* translates the data into packets that can be transferred through the FireWire cable.
 - c. *The Transaction Layer* presents the data to the software on the device that is receiving it.

fast enough to allow video capture directly from a DV camera into a computer without any additional hardware.

This brings up another example of changing terminology. In the previous section, we described “digitizing”—the process of loading video into a computer (making it digital). The process of loading DV into a computer through FireWire is essentially the same, but it cannot properly be called digitizing because the video is already digital! (Of course, many people have continued to call this process digitizing, because that was the accepted term.) More on this process can be found in Chapter 6: Preparation.

With DV cameras and FireWire devices already becoming popular, Apple Computer released Final Cut Pro in 1999. I remember sitting in a friend’s basement, with a borrowed camcorder, capturing digital video through FireWire into Final Cut Pro for the first time. Prior to that, I had used only “professional” systems, and I was amazed to see video captured onto a sub-\$10,000 system (including the camera).

By the eve of the millennium, all three of these advances had been established:

- An inexpensive, high-quality video format (DV)
- A high-bandwidth data-transfer protocol fast enough to capture video directly (FireWire)
- An inexpensive but robust nonlinear video-editing program (Final Cut Pro)



This trio created the technical and market conditions for unprecedented changes in the creation of video projects at all levels.

It should be made clear that Final Cut Pro was not (and is not) the only nonlinear editing program available. However, from the beginning, certain things made FCP special. Indeed, it is FCP, and not any of its competitors, that is quickly becoming the industry standard.

The QuickTime Video Architecture

QuickTime has been around since 1991, when it was introduced as an add-on to the Mac operating system that was used for playing video. At the time, this was a major advance and there was nothing comparable. Essentially, QuickTime is a video architecture, an infrastructure that allows video to be played on a computer. The codec is the algorithm used to encode and decode the digital video; the architecture is the virtual machine that does the decoding.

Final Cut Pro utilizes the QuickTime video architecture for driving video playback while editing. Final Cut Pro is the tool; QuickTime video is the material that the tool works on. This is why the media files you use in FCP have the .mov extension—the native extension of QuickTime files. FCP is not the only Apple program that utilizes the QuickTime architecture; iMovie and iTunes work in much the same way.

Going back to the old days of film, the individual snippets of film are QuickTime files, and the machine used to cut, tape, and play back is Final Cut Pro. As we said, many of the essential principles of editing have not changed very much. If you need further examples of this, notice the language that Final Cut Pro uses (such as “clip” and “bins”) and the iconography (such as the symbols in the browser and the shape of the tools), and you will realize that the very design of the program is meant to recall traditional film methods.

What Is a Codec?

Codec means code/decode, compression/decompression, or compressor/decompressor, and is the name given to the specific algorithm used to compress a piece of audio or video. There is an extended discussion of codecs in Chapter 5. For now, it is enough to know that within the QuickTime architecture, multiple codecs are supported for different media types.

Resolution Independence

If you have used QuickTime to view video on the Web, you may have noticed that it can play back video of various sizes. This ability to work with video of different sizes is known as resolution independence, and it is something that Final Cut Pro shares with QuickTime.

This means that FCP can work with standard- and high-definition footage, and even the higher-definition resolutions used for film and digital intermediate process. It is a very versatile program in this way, and we have seen it used for off-sized video pieces as small as a Flash banner and as large as the JumboTron at the local football stadium.

This is unusual in nonlinear editing solutions, both within and outside Final Cut Pro's price range. With other editing product lines, there is often one piece of software

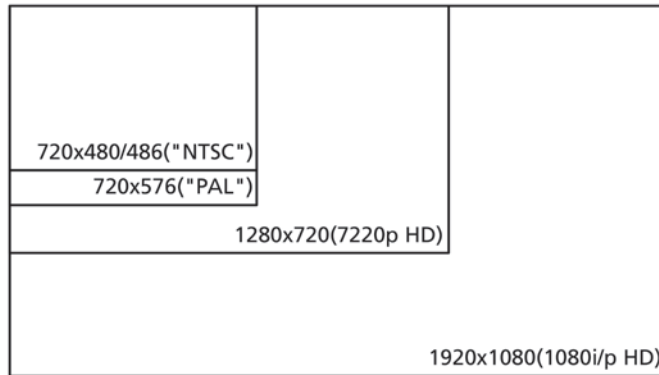


Figure 1.1 Common video frame dimensions.

for DV, another for uncompressed video, and yet another that handles HD. In Final Cut Pro, you may need different hardware to effectively work with different sizes and resolutions, but the software stays consistent.

Resolution independence is not only a benefit for working with different types of video. It also makes for a more flexible postproduction process at any resolution. The reason for this is that Final Cut Pro can mix resolutions and work at a lower resolution for speed and to conserve disk space (higher resolutions often have larger file sizes), and then return to the higher resolution for finishing.

This way of thinking is known as an offline/online workflow, and we will talk much more about it. Originally, it came about in the early days of nonlinear editing, before computers were robust enough to handle full-resolution footage digitally. The solution was to edit with low-resolution proxies or “offline” clips, and then assemble the final piece in a traditional tape-to-tape room based on the decisions that were made nonlinearly.

Final Cut Pro has added a lot more flexibility to this method. Resolution independence means that an HD piece can be rough cut at DV resolution, then reconformed to HD, or that a long piece can be assembled as a low-quality proxy to save drive space. The case studies in Part 3 have several permutations of this.

The resolution-independent nature of Final Cut Pro has gotten more robust in version 6 of the software. Two new features—the Open Format Timeline and the ProRes 422 codec—both expand the flexibility of the system in working with different formats and resolutions. Briefly, the ProRes 422 codec allows users to work with

Resolution and Screen Size

Resolution should not be confused with screen size. Resolution refers to the number of pixels that make up the video frame. A standard-definition (SD) video image is 720x486, and is the same whether you are watching a 13-inch or a 72-inch television. (The difference is that each individual pixel is larger on the larger set.)

Figure 1.1 shows the pixel resolutions, aspect ratios, and relative sizes of some common video formats. For more information on video formats, see Chapter 7.



near-uncompressed-quality video at approximately one-quarter of the bitrate. The Open Format Timeline option will support mixed-format playback on a Timeline with no rendering. These are both very sexy new features, and have the potential to cause another mini-revolution in the postproduction industry, as that financial ceiling for uncompressed and HD work again collapses.

The Democratization of the Form and the Rise of the Prosumer

Prior to the introduction of the Big Three technologies, cost was a huge barrier to entry for any video production even approaching the professional level. There were low-end formats, such as 8mm tape, but their quality was suspect. There were few good inexpensive solutions for editing.

This lower price combined with user-friendly products that were easier to learn made video available to the masses. This leveling applied to aspiring filmmakers, as well as to students, and also moms and dads who wanted to film softball games and birthday parties. The field now was wide open, as an art form, a hobby, and a business.

Alvin Toffler coined the term “prosumer” in his 1980 book *The Third Wave*. The word, a combination of *producer* or *professional* and *consumer*, denoted a blurring of the line that separated a professional producer and an amateur hobbyist. This is an apt description of many of the people who benefited from the democratization of video technologies. Moreover, a line (between professional and amateur) that had once seemed rigid has now been irrevocably breached.

The democratization of the form and the rise of the prosumer is actually a much broader phenomenon. The popularity of do-it-yourself home improvement and the user-made Internet are two more examples.

These changes in video technology allowed higher quality at a lower price and a new degree of creative freedom for professionals and aspiring filmmakers alike. Consider the film *Timecode*, which has simultaneous action filmed with four DV cameras, and the TV series *K Street*, which used a raw documentary style to depict the behind-the-scenes action in Washington, DC. Consider the rise of documentary in general—the genre has changed from a fringe academic form to popular entertainment.

There is a downside to this new availability of technology, this democratization: there are a lot of people who know just enough to be dangerous. This part of the phenomenon runs the gamut from a well-meaning relative who gets over his head with a wedding video to expensive corporate debacles where money is invested in new equipment without the necessary time, planning, and talent to accomplish the real goals.

In the old days, there was a hard line between those who could produce video and those who could not. Only a few could afford the investment in equipment it would take to create video at all. With the new low-priced gear, anyone could do it, so the difference became true practical knowledge and experience—that is, the difference between owning the equipment and knowing how to use it. With the prevalence of Final Cut Pro, we have independent filmmakers doing more and better work than ever before, but we also have hacks selling services from Apple’s marketing material that they don’t really have the ability to perform. With great power comes great responsibility—learn the craft; don’t be a hack!

This is the production/business environment that we now operate in. There is a lot of opportunity here, and greater creative freedom than ever before. To properly navigate this new environment, our most valuable assets are practical and theoretical

knowledge. Only by understanding the production process at a conceptual level can you efficiently communicate with clients and vendors to get the best product at the best price.

In the new arsenal of equipment, Final Cut Pro is both a scalpel and a bazooka. It is special because of its power, flexibility, and price point. Understanding FCP's strengths and weaknesses, and how to build intelligent workflows, will allow you to more effectively plan and execute projects.



Plays Well with Others

One more thing that is special about Final Cut Pro is the software's connectivity and sociability. Admittedly, it is strange to talk about a program being "sociable," but there are actually three interrelated concepts here:

1. Final Cut Pro has a lot of tools that make it useful in team workflows. Projects can be organized, planned, and executed by small and large groups effectively. This is a broad concept that includes the sharing of media, effective methods for reviews of work-in-progress cuts, and working with people of diverse technical abilities.
2. Final Cut Pro works well with other software. This holds true for preparing assets before ingesting into FCP, and also for doing finishing work after the editing is done. Because Final Cut Pro now exists within the larger Final Cut Studio, which includes other postproduction tools, the integration with these programs is particularly tight. Photoshop also works especially well with FCP. Transfer formats such as OMF and XML allow a wide range of data translation to other programs. Lastly, many other companies create plug-ins for Final Cut Pro to create new special effects.
3. Final Cut Pro works well with third-party hardware. Many companies produce hardware specifically to integrate with Final Cut Pro. Probably the most important type of third-party hardware is capture cards, which allow ingestion from a wider range of videotape formats.

Final Cut Pro is uniquely situated as a hub in many current postproduction processes, in large part because of how well it works with other software and hardware, and in team environments.

Getting the Most from Final Cut Pro with Workflows

Because Final Cut Pro is a central piece in many video projects, it is important to plan how this tool will be used by the people on the team and with the other tools in play. Users come to FCP with diverse skill sets and expectations. This sometimes creates the potential for misunderstanding.

Detailed planning of the stages of the process is the best way to get everyone on the same page for an efficient project. We call these plans workflows, and they are the subject of the next chapter.

