

A TOOL CALLED DIGITAL VIDEO

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Abstract

With the ever-growing complexity of our accelerators, remembering the best repair solution in every situation in the field can be difficult. The action of first-responders can make the difference between a short or long down period. Remembering the best response to failures that occur infrequently can be difficult. Enter the world of digital video. Imagine a library of very short videos that first-responders can use to refresh their memories either as a preparatory tool or, even better, right in the palm of their hand when they're standing on the scene. These videos need to be short and concise, but informative. Our approach is to write down a list of objectives, then we use a medium-quality digital camera to convert these objectives to scenes in a digital movie. Finally, we use a video editing program to convert these scenes into a standard video format (.wmv, .mov, etc.). Our Operators have been building a library for the past couple years and are finding it a valuable tool.

RESPONDING TO PROBLEMS

Relying on First-Responders

When things go wrong in the field, it's important for our Operators (first-responders) to be able to quickly assess the situation at the scene. Based on what they observe, it's then equally important for them to immediately intervene with a safe and effective solution.

The Dilemma

Our accelerator systems have grown into a vast and varied world of switches, valves, breakers, lights and cables, each of which needs to be in the right configuration, based on an ever-changing game-plan.

Failure to implement the correct diagnostic and troubleshooting procedures in the proper order, may have serious effects both in terms of safety and accelerator downtime.

Training our Operators is an never-ending task and, in our ever-changing world, it's a recognized necessity. Still, training can only do so much; eventually the time comes to rely on human memory to get it right.

As an example, if a storm should knock out our site power for an extended period of time, our Operators are trained to respond to the threat of over-flowing sump pits, by doing roving patrols to sensitive areas, with a 25kw trailer-mounted generator.

The problem is that this situation occurs so seldom that it would be easy to forget small steps in the procedure on how to operate the generator. When one is dealing with 480-volts, that small step can be deadly. The problem is compounded by the unlikelihood that those people most

familiar with the procedure will be the next to respond (Murphy's Law).

From an Operator's perspective, one can see that it would be a real advantage to be able to greet this, and similar situations, with instant recall. What an advantage it would be to be able to visualize the entire procedure; all the hazards, what items to take along, and how to perform each step in the proper sequence.

The Solution

To aid in the afore-mentioned *visualization* process, our Operators have brought the world of hand-held *digital video* to the workplace.

Over the past couple of years, we've been building a library of short digital videos which can provide them with the ability of "instant recall."

Portable Digital Video Players with large memories, can store thousands of 2-minute videos, available for review of an ad hoc procedure and to drop in one's pocket and take along to the scene.

Unlike standard "training videos"—the ones we all struggle to stay awake through—*these* movies are designed to fit within some reasonable guidelines. They should:

- be short and to-the point (typically ~2 minutes).
- immediately denote where to go and which items need to be taken along.
- clearly point out important items of interest.
- demonstrate each step in the proper sequence.
- use captions rather than sound.

To expound on this last point, we've found that sound is an unneeded and unnecessary complication. Beyond being a possible distraction, as one is missing important points while concentrating on trying to adjust the sound levels, dealing with headphones and their cords could become a safety and hygiene issue. In addition there can be processing and file-size concerns. Why deal with it?

THE MAKING OF A GOOD VIDEO

Keep the Process Painless

On paper and in reality, this department project has been a good one, but it would be unable to sustain itself if the process bogged down in production. So, even there, we've established some realistic guidelines. I'll list them here.

- Plan to have the process completed within 4 hours.
- Begin with a previously-written procedure or, if it's not available, create one, being sure to incorporate all safety concerns into the movie.
- Like ingredients in a recipe, write down what's needed. Don't forget things like keys, protective-clothing, a flashlight, tools, and test equipment. If helpful, write down where these things are located.

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- Continuing with the recipe analogy, create a checklist that logically walks through the *important* steps of the procedure—cooking shows don't show the cake baking.
- Use a medium-quality digital camera that has a “movie mode” option, as shown here. If it has optional settings, set it to *vivid color* at about 640x480 pixels and 25-30 frames/second. Alternately, one can use a low-light-capable video camera which records onto video tape but, unless one is taking advantage of its low-light or zooming capability it's just not worth it, as the following point will explain.
- Transfer the video to a relatively fast computer with movie-editing software, such as Adobe® Premiere® Pro. For the digital camera, this is simply a matter of transferring the file from the camera to the PC, but if you're using video tape, it's a painful process of moving the whole thing over in real time and putting it into editable clips.
- Edit the movie to contain the following clips:
 - a title screen
 - a list of needed items
 - a caption still
 - the movie scenes
 - add “The End”
 - add the credits
- Save and encode the movie in a format which is compatible with your digital video player. For added benefit, place the finished product on an Operator-accessible web page which they can peruse at their convenience.



To make each movie consistent and to save time (and if your movie-editing software provides the option) make templates of each of the editing steps. Likewise, make note of your encoder settings. If these steps are consistent and easy, it'll go a long way in keeping the library growing.

Helpful Hints

In the relatively short time we've been putting these videos together, we've found certain things that work well to counteract the boredom of a typically dull topic.

- In addition to keeping the entire video to ~2 minutes, try to keep each scene to 10 seconds or less.
- If it's necessary to observe the “cake baking” use speed-up techniques. For instance, in the video processing stage, increase the frames/second so that cake bakes at 2 to 4 times its normal speed.
- Where it's possible and without distracting from the point at hand, inject a light amount of levity into a serious topic. Certainly a producer/editor with a good sense of humor helps.
- Remember that scenes don't have to be recorded in sequence, leave that for the editing stage. The check-

list of the production will show which scenes should be recorded when. This will not only speed up the process, but will allow one to take advantage of a given location and the surrounding conditions.

These are just a few helpful observations, but one can't neglect the audience they come from. The best advice of all is to ask for honest feedback from those who use the videos, then turn around and add their observations to the written recipe that will ultimately enhance future productions.

CONCLUSIONS

Although it may seem like this whole process of recording and editing a 2-minute video would be tedious, a test run, from step 1 to turning the product over to the computer to build, required less than an hour. More importantly, it was fun!

At Fermilab, bringing the world of digital video into the Control Room workplace has become a worth-while Operator project and a significant tool in our quest to perform tasks safely and correctly.

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Readers may be interested in the segue to this project which addressed the basic concepts of utilizing training videos in the workplace. A paper was presented by G.P. Zinkann, A. L. Deriy, and D. R. Phillips entitled “In-house Video Based Training for Accelerator Operations” at the *Workshop on Accelerator Operations*, in 2005, and is recorded in the proceedings thereof. Our success has certainly been influenced by applying current technology to the concepts they presented.