Autodesk Smoke Productivity Benchmarks

Pfeiffer Consulting
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Real World Productivity Data for Video Professionals

Introduction

About this document

This document presents key findings of a benchmarking project designed to assess the impact of the Autodesk® Smoke® 2011 for Mac OS® X software on the productivity of the video finishing workflow.

The benchmark compared Smoke with a multi-product video finishing workflow composed of commonly used video editing and effects software, and included a comprehensive set of video finishing tasks.

Benchmarks were executed by seasoned experts of each software platform. For detailed information on the benchmarks and the exact methodology please see page 3.

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The Project

Aim of the benchmarks

This benchmark project was defined to measure the efficiency of the Smoke finishing workflow in a real-world scenario. The workflow benchmarks included a wide variety of different finishing tasks, and compared the time necessary to execute these tasks with Smoke on one hand, and with a multi-product finishing workflow combining popular editing and effects software packages on the other.

The aim of benchmark project was to assess the actual efficiency of the experienced user when required to work on an entire project. It was defined in a way that would actually measure the time necessary to execute all the workflow operations, but without measuring the time for experimentation and hesitation.

In other words, the benchmarks focused on operational efficiency in a real-world example, including operator time to enter the settings and parameters, the processing time (when required), and of course the time it took to export the finished footage. (In the case of the multi-product workflow, the benchmark also measured the operations and processing necessary to move between the editing and effects programs and for tracking, retouching, and color grading.)

How the benchmarks were executed

The workflow benchmark was defined by a detailed list of finishing operations that had to be executed by the operator. (See list on following page.)

To execute the benchmarks, we selected an expert operator for each environment: a seasoned professional with several years of production experience in his respective production environment.

Benchmark phases were executed individually, and the times for all phases were added up to provide the total time. In order to factor out hesitation and experimentation, the operator for each platform was permitted to experiment which approach he would take, so that once the operation was timed only the actual time to achieve a given result was taken into account.

About the footage:

The footage used was original footage from a long-form project currently in post-production. The format used was 1080p Apple® ProRes®.

Methodology

Hardware Platform

Hardware

All benchmarks were conducted on an Apple® Mac® Pro workstation equipped with a 3.32GHz quad-core Intel Xeon® processor

Memory

16GB DDR3 1066Mhz EEC RAM

Storage

Internal RAID array of four 7200RPM SATAII drives

Graphics Card

NVIDIA® Quadro® FX 4800® graphics card

Display

Calibrated 30-inch Apple Cinema Display (2560*1600 resolution)

System Software

Mac OS® X Snow Leopard® 10.6.4. operating system software.

Configuration

All benchmarks were conducted on standard configuration workstations completely re-initialized for the benchmarks.

Detail of Workflow Operations

What is it all about?

The workflow benchmark was designed to contain a comprehensive list of finishing operations that were to be executed on a segment of a project that had been edited in a video-editing program and needed to be finished.

The edited HD video segment was opened in each of the defined finishing environments as an XML file and the following operations were executed.

Workflow operations covered

- **Create 2D Title**
- **Stabilize aerial shot and retouch lens-flare**
- **Create 3D Title animation**
- **Simple and complex color grading**
- **Simple and complex tracking**
- **Complex compositing (Create key, insert/animate text between key and background)**
- **Track spot on character**
- **Render translucent logo over entire clip**
- **Export complete finished sequence in 10bit uncompressed YUV**

Description of the finishing operations

Note

The project-based workflow benchmark was conducted using a 8-minute segment of a long-form project currently in post-production. While for confidentiality reasons we cannot share visuals of the footage, the list below provides a detailed description of the sequences and operations executed during the benchmarks.

Starting point: The edited sequence

Starting point for the benchmark was a basic 8 minute segment of the project edited in a multi-product workflow, comprising all the sequences.

Sequence 1: Create fade-in and 2D Title

Slow title sequence of the project, shot indoor, over the main actor.

Operations to be conducted were: Create long fade-in, create and process the title animation, text with drop shadow moving in from the right, animated over 26 seconds, remaining stable for the rest of the sequence.

Sequence 2: Stabilize and retouch lensflare

The second sequence was a traveling shot over a foggy landscape, filmed from a balloon.

Operations to be conducted were: stabilize entire clip (required two independent tracks to be connected); remove lens flare over portion of the clip.

Sequence 3: Create 3D Title animation

Sequence 3 was a 3D title animation defined specifically for this project.

Operations to be conducted were: Create and process a 3D animated fly-in title, obtained through camera movement, zooming in and out of a 2D text element. Rendering to be executed with motion blur.

Sequence 4-7: Color grading

Sequences 4 to 7 were outdoor night shots that were too orange and oversaturated.

Operations to be conducted were: Correct mid-tones, highlights and color temperature on the first shot; apply identical color grading to shots 5-7. Process color grading. (Note: in multi-product workflow, this operation was possible without leaving the program environment.)

Sequence 8: Complex tracking/stabilizing

Sequence 8 was a shaky handheld shot of the main actress seen from front-left, walking down a sunny park lane. Extreme changes in the natural lighting made this shot particularly complex to track.

Operations to be conducted were: Stabilize shot. Several tracks and manual correction of the tracking points were necessary for a satisfactory result.

Sequence 9: Tracking and stabilization

Given the problems with the previous shot, an alternate clip from the project was used for a simpler tracking example. The clip was a shaky handheld shot, moving forward on railway tracks.

Operations to be conducted were: Stabilize shot using two parallel tracking points.

Sequence 10: Retouch and complex color grading

Sequence 10 was a naturally lit shot of two actors entering a small Parisian apartment, filmed on a tripod from within the apartment.

Operations to be conducted were: Correct overall color tone, balancing of light inside the room and outside the window, local color correction (de-saturation of main actress's hair and skin-tone), as well as removal of a sensor speck on 100 frames of the footage. (Note: In multi-product workflow, color correction was conducted exporting the sequence to a dedicated color-grading program, and re-importing rendered corrected footage. In Smoke primary and secondary color correction were used.)

Sequence 11: Complex compositing

The final shot of the project was a long clip shot on a tripod, to be used as background and combined with keyed-in green-screen footage of one of the actors and end-trailer.

Operations to be conducted were: Create key with cut-out for green screen footage of one of the actors. Animate end trailer, composited between background and keyed green-screen footage. Track and mask blemish on actor's face.

Branding: Render translucent logo over entire clip

Operations to be conducted were: Render translucent logo of the production company over entire segment (8 minutes of footage)

Complete clip: Export final footage

Complete Results/1

The power of integration

The comparison of the detailed benchmark results offers interesting insights into the efficiency gains an integrated, highly optimized finishing environment such as Smoke can provide.

As in many deadline-driven, time-sensitive production environments, every click counts, and every trip to the menu bar slows the user down, particularly for operations that are repeated dozens or hundreds of times in a work day.

It is interesting to note that Smoke is more efficient in almost every single segment of this real-world workflow benchmark.

While a multi-product workflow offers a great variety and diversity of tools and options, there are several key areas where Smoke provides great functional depth and efficiency, such as the integrated keying and tracking modules as well as the 3D compositing and effects environment.

Detailed results

	Smoke	Multi-product workflow
Sequence 1: Create fade-in and 2D title	**0:02:08**	**0:02:27**
Create fade-in	0:00:10	0:00:12
Create 2D title and process	0:01:58	0:02:15
Sequence 2: Stabilize and retouch lensflare	**0:07:01**	**0:09:23**
Stabilize	0:03:06	0:02:40
Retouch	0:03:55	0:04:26
Render for integration (multi-product workflow)		0:02:17
Sequence 3: Create 3D title animation	**0:02:25**	**0:04:17**
Create Process	0:02:25	0:04:17
Sequence 4-7: Color grading	**0:02:32**	**0:03:02**
Color correct 1 scene Apply correction to following scenes	0:02:32	0:03:02
Sequence 8: Complex tracking	**0:04:45**	**0:04:51**
Insert clip	0:00:18	0:00:19
Create track and process	0:04:27	0:04:32
Sequence 9: Tracking and stabilization	**0:01:23**	**0:04:41**
Create track and process	0:01:23	0:04:41

Time in Hours:Minutes:Seconds. Lower is better.

Complete Results/2

The impact of the user interface

Another aspect that became clearly evident in these benchmark results is the benefit of a process-specific user interface.

Multi-product workflows largely rely on user interface conventions of the underlying operating system, such as Mac OS X or Windows®. While these user interface conventions have the advantage of making ad-hoc learning and superficial use of computer and software much easier, they have a tendency of slowing the user down in time-sensitive and highly specialized production tasks.

Smoke, on the other hand, provides a task-specific user interface designed for greater efficiency in the specific production environment of video finishing; and while it requires some initial learning, it is clearly efficient overall in the production tasks covered in this benchmark study.

Detailed results

	Smoke	Multi-product workflow
Sequence 10: Retouch and complex color grading	**0:04:52**	**0:12:59**
Retouch stain	0:02:27	0:08:36
Color correct 1+2 (Color Warp/Color export)	0:02:25	0:04:23
Sequence 11: Complex compositing	**0:07:48**	**0:12:23**
Create key	0:02:25	0:04:17
Insert text between key and background	0:03:29	0:03:28
Track blemish on character	0:01:54	0:04:38
Branding: Render translucent logo over entire clip	**0:08:48**	**0:10:30**
Insert and process	0:08:48	0:10:30
Complete clip: Export final footage	**0:19:11**	**0:14:00**
Export 10bit uncompressed YUV	0:19:11	0:14:00
Total (All editing and finishing operations)	**0:41:42**	**1:04:33**
Total (Editing operations and export rendering)	**1:00:53**	**1:18:33**

Time in Hours:Minutes:Seconds. Lower is better.

Key Efficiency Advantages 1

Complex Compositing

The integration of the Keyer module within the core finishing and editing environment provides tighter integration and reduces the time-consuming moves between different software applications typical in a multi-product workflow. The efficiency impact of this integration is clearly evident in **Sequence 11** of the workflow benchmark, which combines keying and compositing for the creation of a title sequence.

Smoke
62.99% (7 min. 48 sec.)

Multi-product workflow
100% (12 min. 23 sec.)

Shorter is better

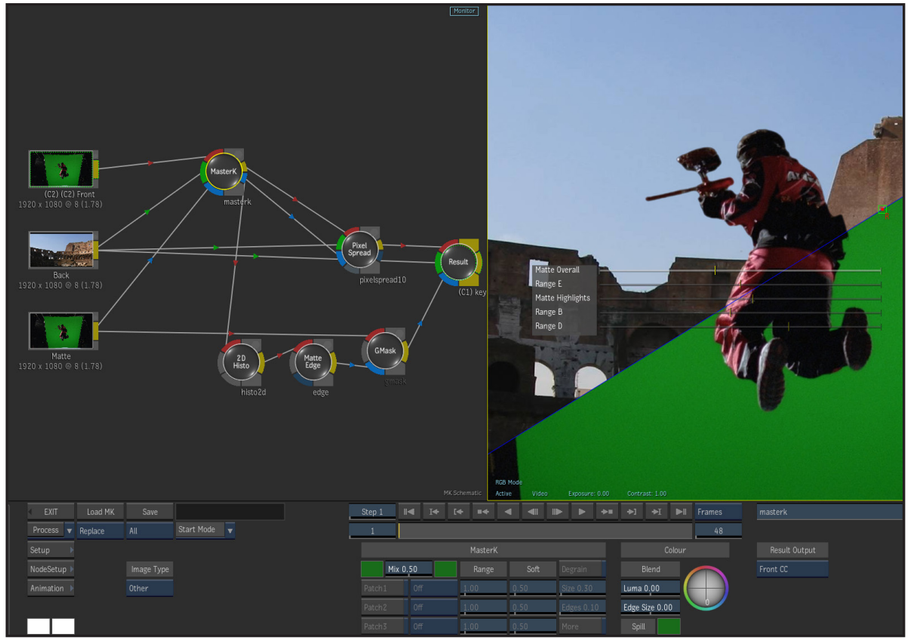
Integration

Integration of the major tools of the finishing workflow is key to the efficiency gains you get with Smoke. In **Sequence 10**, the color correction and retouching of a sequence was completed directly in Smoke, while in the multi-product workflow, it was necessary to export and process the footage in the effects package, and then re-import the corrected clip into the editing environment.

Smoke
37.48% (4 min. 52 sec.)

Multi-product workflow
100% (12 min. 59 sec.)

Shorter is better



Layering and compositing is one of the areas where Smoke provides a measurable productivity gain.

The integrated approach and the efficiency of the task-specific user interface make it easy to work with complex multiple dependencies common in professional video finishing work.

Integration of all key components of the finishing workflow in a single application is one of the key distinguishing factors between Smoke and a multi-product workflow.

Smoke not only integrates a powerful 3D text-engine, but also a comprehensive 3D compositing environment.

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Key Efficiency Advantages 2

Tracking and Stabilization

The tracking module in Smoke was used for a variety of tasks in the workflow benchmarks: stabilizing footage, tracking elements, and a variety of retouching tasks such as removing a lens flare from footage.

Below are the benchmark results from **Sequence 9**, tracking a forward-moving hand-held shot with two tracking points in order to stabilize it.

Smoke
29.54% (1 min. 23 sec.)

Multi-product workflow
100% (4 min. 41 sec.)

Shorter is better

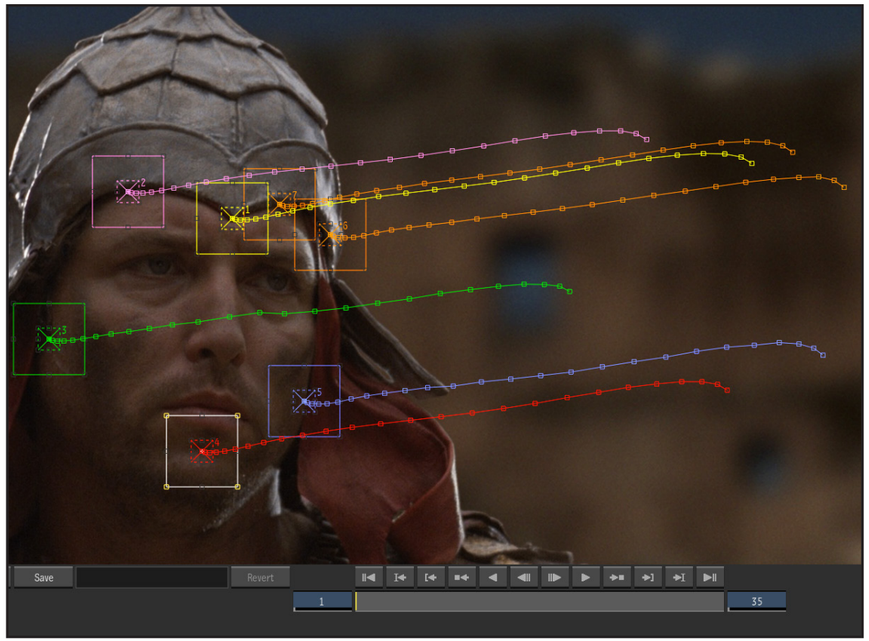
Integrated Color Grading

Integration of complex color grading with primary and secondary color corrections also shows the impact of integration on efficiency: for the complex color grading operation in **Sequence 10** of the workflow benchmark, the footage had to be exported to a color grading software in the multi-product workflow setup. It was then processed and re-imported. With Smoke, the footage was color graded in the application.
Smoke was nearly twice as fast in this sequence.

Smoke
55.13% (2 min. 25 sec.)

Multi-product workflow
100% (4 min. 23 sec.)

Shorter is better



The integrated tracking engine in Smoke combines sophisticated tracking and stabilization options with an efficient rendering engine that provides fast throughput and eliminates the need for tracking in a separate application environment.

Integrated color grading in Smoke provides efficient, sophisticated color grading options without the need of an external color grading program, and supports output-specific color management for display and rendering.

Methodology

This benchmark project was commissioned by Autodesk and independently executed by Pfeiffer Consulting.

All the productivity measures presented in this document are based on **real-world workflow examples designed and executed by expert operators of each benchmarked software environment**.

No scripting or programming of any kind was used during the execution of the benchmarks.

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This report was created by Pfeiffer Consulting (http://www.pfeifferconsulting.com).

Images courtesy of Les Films Stupéfiants & Buzzimage Group

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