



**Autodesk 3ds Max 2011:
Market Perspectives, Productivity
and Return on Investment**

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Introduction

About this Report

This report presents the findings of a market specific benchmarking project conducted by Pfeiffer Consulting for Autodesk, combined with technology analysis of the latest release of Autodesk 3ds Max.

Productivity measures, based on the *Pfeiffer Consulting Methodology for Productivity Benchmarking*, compared workflow productivity based on the Autodesk 3ds Max 2011 with the 2008 release of the software. Workflow benchmarks and efficiency measures analyzed the productivity impact of features introduced in 3ds Max 2011, and previous releases on workflows using 3ds Max 2008. For details on the methodology used for the productivity benchmarks, please refer to the *Methodology* sidebar on the page 5, or to the complete benchmark report.

Structure of this Report

This report is structured in 3 sections:

Pushing the Envelope of 3D Production (page 4) analyzes the challenges of 3D software and the feature additions of 3ds Max 2011.

Productivity in 3D Modeling and Animation (page 6) concentrates on the productivity impact of new features in 3ds Max 2011.

The Cumulative Effect of Productivity Gains (page 8) analyzes the effect of productivity gains on return on investment.

About Pfeiffer Consulting

Pfeiffer Consulting's mission is to provide unique high-level, international market intelligence and strategic consulting for both content and technology providers.

Pfeiffer Consulting is the publisher of the *Pfeiffer Report on Emerging Trends and Technologies*, an online resource on trends in the technology and content industry, as well as numerous specialized studies and reports.

For more information, please visit: www.pfeifferconsulting.com.

Major Findings

- ▶ 3ds Max 2011 introduces several significant new features that can help **expand creative possibilities** as well as **operating efficiency**.
- ▶ Productivity research conducted for this project show that **3ds Max 2011 offers significantly enhanced productivity over older releases** in a variety of product areas.
- ▶ Return on investment projections show that **3ds Max 2011 can yield return on investment of close to \$16,000** per workstation per year.

About Pfeiffer Consulting

- ▶ Pfeiffer Consulting is an **independent technology research institute and consulting operation** focused on the needs of digital content professionals.
- ▶ Download the complete **Autodesk 3ds Max 2011 Benchmark Report** at www.pfeifferreport.com.



Pushing the Envelope of 3D Production

Major Points

- ▶ Professional 3D software faces the double challenge of **providing cutting edge functionality while constantly improving production efficiency.**
- ▶ **3ds Max 2011 features CAT** (Character Animation Toolkit), which **significantly helps to streamline the rigging process** by providing a wider variety of highly customizable, pre-rigged characters.
- ▶ The Quicksilver hardware renderer is a new rendering option that uses the processors of display cards to **more quickly produce superior quality animatics and draft renderings.**

The Double Challenge

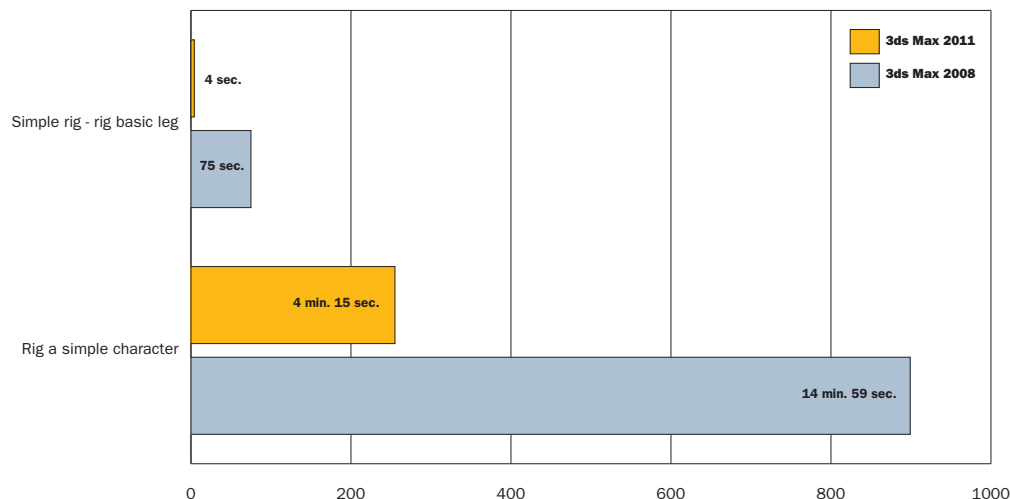
Generally, developers of software applications face two contradictory challenges: On one hand, they have to add functionality to increase the overall usefulness and competitiveness of their products; on the other they have to strive as best they can to make their software packages simpler to use and more efficient in production tasks.

Nowhere is this double challenge more clearly visible than in professional 3D software. Despite the fact that programs such as Autodesk 3ds Max or Autodesk Maya have seen their functionality and capabilities expand significantly over the past decade, it is surprising how much new ground these programs still manage to break with subsequent releases. (Additions such as CAT, the Character Animation Toolkit introduced with 3ds Max 2011, for instance, constitutes an important feature extension for the vital area of character rigging, essential in game and film production alike.)

But with power comes complexity: 3D workflows are characterized by a seemingly endless chain of complex, repetitive manipulations, that can

CAT: Expanding the Boundaries of Character Rigging

CAT: Character Rigging Benchmark
Time scale in seconds. Shorter is better.



Character Animation Toolkit, (or CAT for short) is exactly what the name implies: a toolbox to assist the rapid creation of a variety of fully rigged characters. While the basic approach of CAT is similar to the Biped module in 3ds Max, its capabilities exceed its ancestor: CAT makes it easy to create and adapt characters and all sorts of animals and fantasy creatures, which are ready to be animated.

The benchmark results from this project underline the gain in efficiency CAT provides.

Methodology

This report is based on technology analysis and market-specific productivity benchmarks conducted by Pfeiffer Consulting for Autodesk. It also includes elements from independent research and technology analysis projects conducted by Pfeiffer Consulting.

Productivity Measures

Pfeiffer Consulting conducted market-specific performance, productivity and efficiency benchmarks of common 3D workflow situations, comparing features and productivity enhancements introduced with recent releases of Autodesk 3ds Max, as compared with the 3ds Max 2008 release of the software.

Nature of productivity benchmarks

Experienced professionals performed segment-specific workflow tasks and assignments, defined in clearly repeatable steps and executed in a closely monitored way.

To ensure real-world results, no scripting was used for any benchmarks.

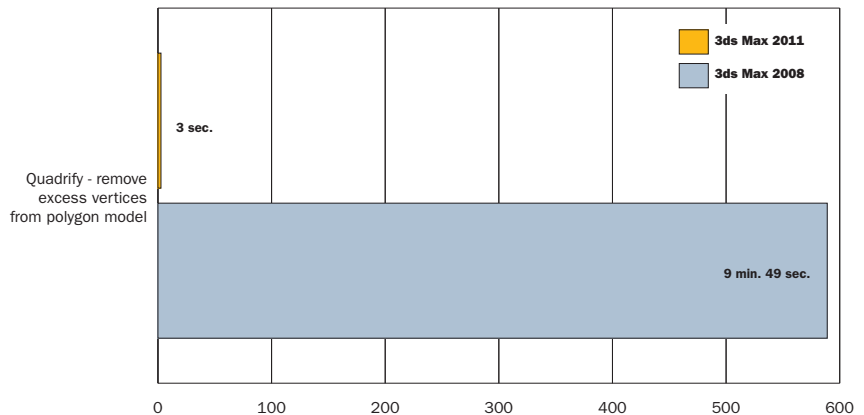
System specifications

Benchmarks compared features introduced in 3ds Max 2011 as well as previous releases with 3ds Max 2008. Benchmarks were conducted on two identical Dell™ Precision™ T7400 workstations equipped with 2.83GHz quad-core Intel® Xeon® processors and with 4 to 32 GB of RAM, factory-configured respectively for 32-bit and 64-bit Windows® operating systems.

For in-depth discussion of the benchmark methodology, system configurations, and comprehensive benchmark description and results, please download the complete “Autodesk 3ds Max 2011 Benchmark Report” at www.pfeifferreport.com.

Model Optimization

Time-scale in seconds. Shorter is better.



The Quadrify function introduced in 3ds Max 2010 automates the labor-intensive optimization process of imported polygon meshes. The benchmark shows the time necessary to clean up the model of a simple, 800 polygon 3D game character.

be extremely time consuming. Be it modeling, texture creation, rigging and animation or rendering, making the professional user more productive implies looking closely at the time-consuming production tasks, and finding ways of eliminating redundant or unnecessary steps. Not a negligible task to say the least...

A Landmark Release

In many respects, 3ds Max 2011 is an important release, which adds a number of new features to the long list of the program's tool-box.

There is CAT, of course, which makes it possible to create fully rigged, sophisticated characters in less time than necessary previously, and will help redefine not only how but what is created in terms of character animation. CAT allows even small teams that do not have dozens of highly trained specialists at their disposal to create a level of animation sophistication that was previously reserved to the largest production houses. (Without even mentioning the creative energy its simplicity will provide for character artists.)

Another addition to the 3ds Max toolset is called Quicksilver, a new hardware-based rendering engine introduced in the 2011 release. Quicksilver brings more sophisticated rendering techniques; global illumination that used to require time-consuming ray tracing techniques to production workflows that need to combine sophisticated rendering with faster throughput. (See sidebar on page 7.)

This benchmark project focused more specifically on productivity enhancements introduced to 3ds Max 2011: we analyzed the impact of the new Slate Material Editor and Map Browser on texture creation and shader management.

The benchmarks also cover productivity enhancements introduced in recent releases of 3ds Max, including some of the Graphite modeling tools, that provide a much-needed boost in productivity for the time consuming tasks of polygonal modeling and the optimization of 3D meshes.

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Productivity in 3D Modeling and Animation

Major Points

- ▶ 3ds Max 2011 offers a wide variety of productivity and efficiency enhancements over older releases of the software, including **significantly enhanced character rigging, high-quality hardware-based rendering and streamlined modeling tools.**
- ▶ The new **Slate Material Editor** expands the existing texture creation functionality in 3ds Max by offering **a highly efficient node-based interface for complex shaders** and a **streamlined Map Browser.**
- ▶ Tools for optimizing polygon models have **been considerably expanded** and provide **significantly higher productivity** than older releases of 3ds Max.

Sophistication vs. Efficiency

How do you balance the need for seemingly unlimited sophistication with the efficiency required by heavily deadline-driven production schedules? It is not an easy problem. 3ds Max is probably one of the deepest software programs on the planet; every major application area requires the expertise of a trained specialist, yet their work is punctuated by highly repetitive (not to say mind-numbing) tasks that can take hours to complete, yet in most cases cannot be automated.

Increasing productivity, therefore, means eliminating unnecessary steps. In terms of efficiency, every second counts, every click adds up. There is nothing more annoying than having to repeat an unnecessary trip to the menu bar or to a dialogue box over and over again.

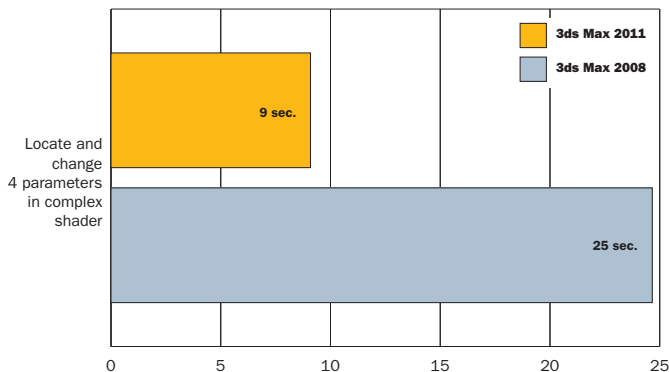
3ds Max 2011: Key Productivity Features

Productivity enhancements come in all sizes and shapes. Some can be a complete new toolset that facilitates previously complex tasks to make them more accessible. **CAT**, the Character Animation Toolkit introduced in 3ds Max 2011 belongs to this category: by providing a wide range

Slate Material Editor and Map Browser: Efficiency in Managing Complex Shaders

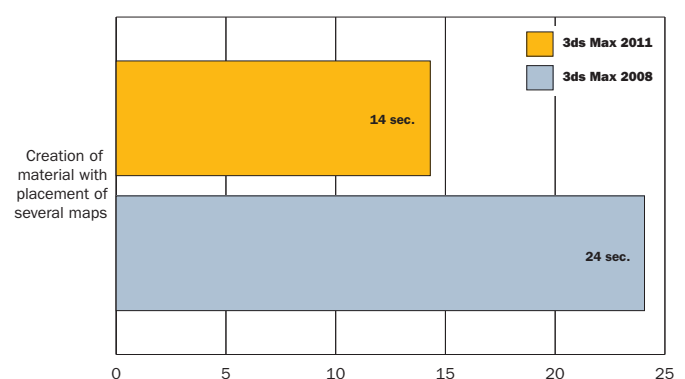
Slate Editor

Time-scale in seconds. Shorter is better.



Map Browser

Time-scale in seconds. Shorter is better.



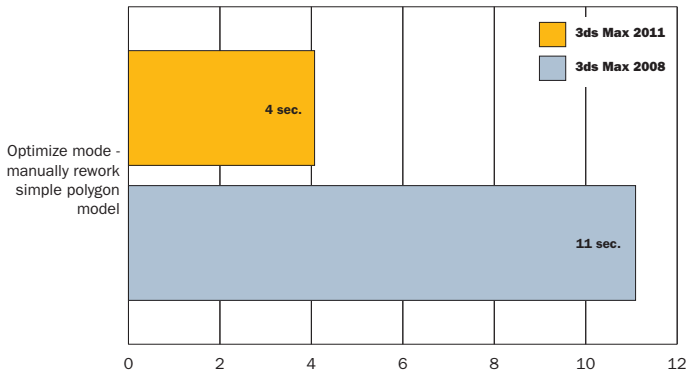
Creating and managing the sophisticated shaders required for modern 3D production relies on multiple dependencies between shader attributes, materials and maps. The newly introduced Slate

Material Editor with the new Map Browser in 3ds Max 2011 can speed up the work on complex materials significantly, as the benchmarks for this project show.

Polygonal Modeling: Optimizing Geometry in 3ds Max 2011

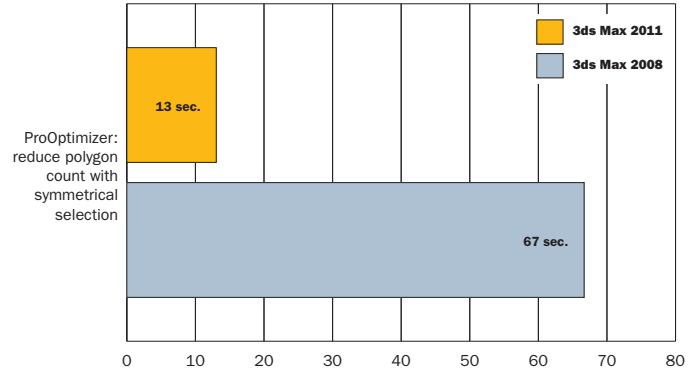
Model Optimization

Time-scale in seconds. Shorter is better.



Model Optimization

Time-scale in seconds. Shorter is better.



Optimizing imported polygon meshes is an essential part of the 3D production workflow. 3ds Max offers several new options for accelerating this time consuming process: the Optimize mode makes

it much easier to manually adjust models. (Chart on the left.) The ProOptimizer feature automatically reduces the polygon count and can automatically create symmetrical selections. (Chart on the right.)

of pre-rigged characters ready to be customized, it revolutionizes the creation of IK structures indispensable for animation, allowing users in a few minutes to create animation-ready characters that would have taken a specialist hours if not days to complete. (See chart on page 4.)

Another group of productivity features benchmarked for this report automate manual processes, replacing dozens or hundreds of individual manual operations with a simple click. The **Quadrify** feature belongs to this group, and accelerates the process of cleaning up imported 3D meshes considerably. (See chart on page 5.)

Some productivity enhancements are based on general user interface improvements that make the creation and the management of complex settings more efficient. The newly introduced **Slate Material Editor** and **Map Browser** in 3ds Max 2011 belong to this group: rather than offering a replacement of the standard material editor (which is still available), the Slate Material Editor adds a node-based interface for complex materials that extends the existing functionality; our benchmarks confirm the productivity gains that it can provide when working with complex shaders. (See chart on previous page.)

Tweaking the Polygons

The last group of productivity enhancements concerns existing tools, and allows frequently repeated tasks to be completed in fewer steps. While these improvements may not seem very spectacular for the layman, experts immediately recognize their utility — and the efficiency gains they can provide.

The best example for this group are the **Graphite Modeling Tools** in 3ds Max, which reduce many multi-step processes in the polygonal modeling workflow to a few clicks; since the operations they target are very basic, frequently repeated tasks such as selecting or modifying parts of polygon models, the cumulative productivity gain over time can be spectacular. (See charts on page 8 and table on page 10.)

Quicksilver

The Quicksilver rendering engine introduced with 3ds Max 2011 provides a hardware-based solution for fast, high-quality still images and animations, and supports sophisticated rendering techniques such as ambient occlusion, depth of field and indirect lighting, yet can provide significantly faster throughput than conventional raytracing.

While the rendering quality Quicksilver provides is impressive, its aim in the line-up of rendering options provided by 3ds Max is clearly not to displace mental ray as production-quality output, but to offer a hardware based rendering solution that makes it possible to quickly produce superior quality animatics and draft renderings that can accelerate the decision making process without the overhead of raytraced output.

The Cumulative Effect of Productivity Gains

Major Points

- ▶ In terms of efficiency, **even seemingly small productivity gains** of frequently repeated operations can **yield significant return on investment**.
- ▶ Return on investment projections based on reasonable weekly repetitions of the features benchmarked for this research project show that **3ds Max 2011 can yield a return on investment of close to \$16,000** per workstation per year.

ROI can be a subjective notion

While in some sectors of activity, the exact meaning of ROI can be very clearly understood and easily defined, this is far from being the case in creative industries in general, and in particular when investments in enabling technologies are concerned.

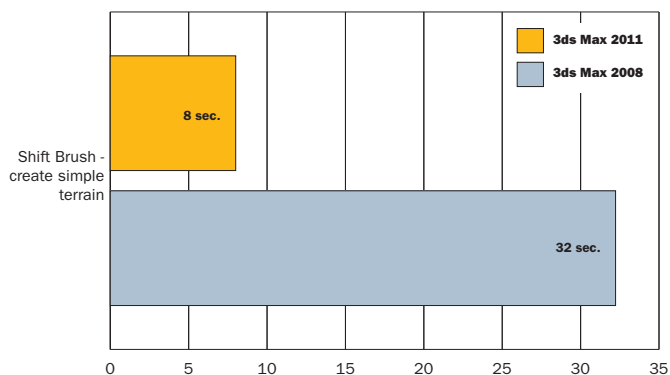
ROI is essentially a matter of approach: what exactly is considered a valid return on investment? While a decision maker in a bottling plant may have a clear idea the return of a specific technology investment may bring, the situation is much less clear-cut in a game house, advertising agency, or video production company — essentially, any company where the goods sold depend on creativity and not just production capacity.

Perceived ROI also varies considerably depending on the size of an operation: Smaller studios and creative agencies frequently value the creative edge a new tool provides more than they do calculated cost savings, and thus base their equipment decisions on available funds

Selection Tools: The Impact of the User Interface on Productivity

Graphite Modeling Tools

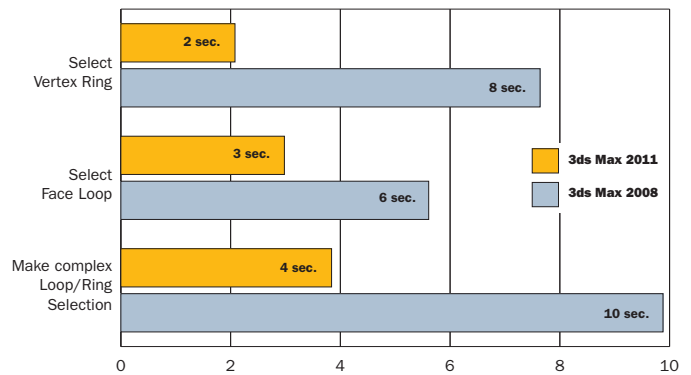
Time-scale in seconds. Shorter is better.



3ds Max 2011 offers a host of features designed to accelerate common polygonal modelling tasks. The Shift Brush allows users to smoothly distort a polygon mesh, a process that would have required manually

Intelligent Selection Tools

Time-scale in seconds. Shorter is better.



adjusting soft selections before. (Chart on the left.) The Intelligent Selection Tools reduce common operations that used to require a multi-step process, to a few clicks. (Chart on the right.)

About the ROI Projections

The ROI projections at the end of this document have been calculated using a simple methodology. The top half of the table presents the features taken in account, and calculates **the number of seconds saved by one individual operation** over a previous release. In addition, these time savings are mapped to the hourly cost of a creative professional.

The lower half of the table uses the same features and time savings, **applies a reasonable weekly frequency of use for each feature, and calculates the cost savings based on hourly rates.**

Finally, the bottom of the table presents **the cumulated cost savings of all features included in the table over a month and a year** (based on 20 workdays per month and 220 workdays per year).

and immediate usefulness; in larger operations such as studios, cost of deployment and training will factor heavily in any decision to purchase or upgrade creative technologies.

The Invisible Gains

There is one factor, however, that is almost universally underestimated when analyzing return on investment: **the considerable cumulative effect of small productivity gains in everyday operations** that a new software release can bring.

Let's take a simple example: each time one uses the Intelligent selection tools instead of the previous, multi-step method for selecting specific parts of a model, one saves between 2 and 10 seconds. But these options can be used dozens of times during the course of a work day. **Repeated just twenty times a day, this single functionality can save a designer close to an hour per month.** And we are only considering a single, isolated (and seemingly minor) feature. Once one starts adding up the individual productivity gains provided by a variety of efficiency enhancements and features introduced in recent releases of 3ds Max, it is clear that the returns on investment can be very significant.

Every Click Counts

It is a widely accepted fact in productivity research and ergonomics that **every click counts, and every trip to the menu bar slows the user down.** If one works in an office environment without particular time pressure, these gains may seem insignificant, but in highly competitive, deadline-driven businesses such as game and development and 3D film production, even seemingly minor productivity gains are immediately useful.

The Bottom Line

Pfeiffer Consulting has analyzed the data from the productivity benchmarks to establish the impact of productivity gains on return on investment. **Autodesk 3ds Max 2011 increases the productivity of average users by providing efficiency gains in many everyday operations.** The ROI can very easily reach thousands of dollars per workstation per year: Based on the workflow projections documented on the following page, which calculate the impact of repetitive use of the benchmarked productivity features, **the ROI impact of 3ds Max 2011 can easily reach \$16,000 per year and per workstation.**

Autodesk 3ds Max 2011: Return on Investment Scenarios (Per Workstation)

	Prod. measures in 3ds Max 2008 workflow (Time in seconds)	Prod. measures in 3ds Max 2011 workflow (Time in seconds)	Individual time savings (seconds)	Productivity gain (%)	ROI generated (1 hour @ \$100)
Incremental productivity gains (Return on Investment generated by individual operations)					
Graphite Modeling Tools					
▶ Selection tools: Select Vertex Ring	7.64	2.08	5.55	72.72%	\$0.15
▶ Selection tools: Select Face Loop	5.61	2.96	2.66	47.33%	\$0.07
▶ Selection tools: Make complex Loop/Ring Selection	9.88	3.84	6.04	61.15%	\$0.17
▶ Selection Preview Mode: Tweaking simple model	16.21	9.58	6.63	40.88%	\$0.18
▶ Swift Loop Tool	29.51	6.10	23.41	79.32%	\$0.65
▶ Dot Loops/Dot Rings	43.11	9.10	34.01	78.89%	\$0.94
▶ Shift Brush: Create simple terrain	32.23	8.00	24.23	75.19%	\$0.67
Model Optimization					
▶ Quadrify: Remove excess vertices from polygon model	589.00	2.67	586.33	99.55%	\$16.29
▶ Optimize mode: Manually rework simple polygon model	11.09	4.07	7.02	63.27%	\$0.19
▶ ProOptimizer: Reduce polygon count	66.67	13.04	53.62	80.44%	\$1.49
Slate Editor and Map Browser					
▶ Slate Editor: Locate/change 4 parameters in complex shader	24.66	9.09	15.57	63.13%	\$0.43
▶ Slate Editor: Locate/change maps and colors in complex shader	32.79	20.30	12.49	38.10%	\$0.35
▶ Map Browser: Create material (<i>placement of several maps</i>)	24.07	14.31	9.77	40.57%	\$0.27
CAT					
▶ CAT: Simple rig - rig basic leg	75.00	4.12	70.88	94.51%	\$1.97
▶ CAT: Rig a simple character	899.00	255.00	644.00	71.64%	\$17.89
ROI projections (based on incremental productivity gains)	Time saved (seconds)	Number of occurrences (Per week)			ROI (1 hour @ \$100)
Graphite Modeling Tools					
▶ Selection tools: Select Vertex Ring	5.55	50			\$7.71
▶ Selection tools: Select Face Loop	2.66	50			\$3.69
▶ Selection tools: Make complex Loop/Ring Selection	6.04	25			\$4.20
▶ Selection Preview Mode: Tweaking simple model	6.63	50			\$9.20
▶ Swift Loop Tool	23.41	20			\$13.01
▶ Dot Loops/Dot Rings	34.01	10			\$9.45
▶ Shift Brush: Create simple terrain	24.23	10			\$6.73
Model Optimization					
▶ Quadrify: Remove excess vertices from polygon model	586.33	10			\$162.87
▶ Optimize mode: Manually rework simple polygon model	7.02	50			\$9.75
▶ ProOptimizer: Reduce polygon count	53.62	10			\$14.90
Slate Editor and Map Browser					
▶ Slate Editor: Locate/change 4 parameters in complex shader	15.57	25			\$10.81
▶ Slate Editor: Locate/change maps and colors complex shader	12.49	25			\$8.68
▶ Map Browser: Create material (<i>placement of several maps</i>)	9.77	10			\$2.71
CAT					
▶ CAT: Simple rig - rig basic leg	70.88	5			\$9.84
▶ CAT: Rig a simple character	644.00	5			\$89.44
	Total ROI generated/week				\$362.99
	Total ROI generated/month				\$1,451.96
	Total ROI generated/year				\$15,971.55