C a m b a s h i L i m i t e d

AutoCAD 2006 Productivity Study

White paper

for Autodesk

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The following white paper is intended as a guide to help a practising architect make an upgrade decision.

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AutoCAD 2006 architects 29% more productive.
What will upgrading do for YOU?

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CAMBRIDGE, UK – Every new release of software claims to be better than the last. So, just how much better is the new AutoCAD? To reveal more, Cambashi – an independent consulting firm – compared AutoCAD 2006 versus AutoCAD 2002 on a typical design exercise for a random sample of architects.

The findings were clear. On average, architects using 2006 completed their task 29% faster than those using 2002.

So, how much more productive can you expect to be? To find out, read on.

2002 versus 2006
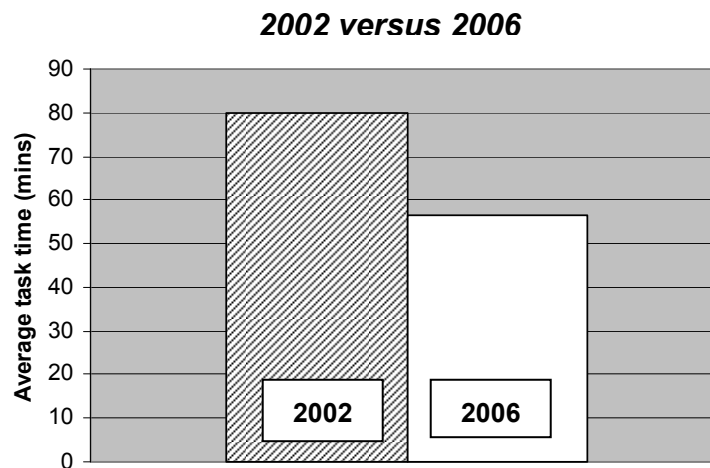
Clear result: Architects using 2006 completed an identical task 23 minutes faster, on average, than their 2002 counterparts.

Design exercise

The comparison was achieved by timing architects as they worked through a typical design exercise. The exercise accurately reflected the most common design and detailing tasks that architects undertake during a typical working day, while enabling them to make use of specific new AutoCAD 2006 features.

> *Participant quotes:*
>
> *"The tasks undertaken were representative of everyday tasks."*
>
> *"These are pretty much all the basic tasks we do."*

It was developed in partnership with award-winning architects Annand & Mustoe, whose work includes the Isaac Newton Institute for Mathematical Sciences in Cambridge University. Like most UK architects, a large proportion of their work is residential design.

The exercise (full details in the Appendix) was based around the detailing and scheduling of a typical residential floor-plan. Drawings of the floor-plan were prepared and basic instructions written, making use of the most common AutoCAD functions. Both AutoCAD 2002 and 2006 users were asked to make identical changes.
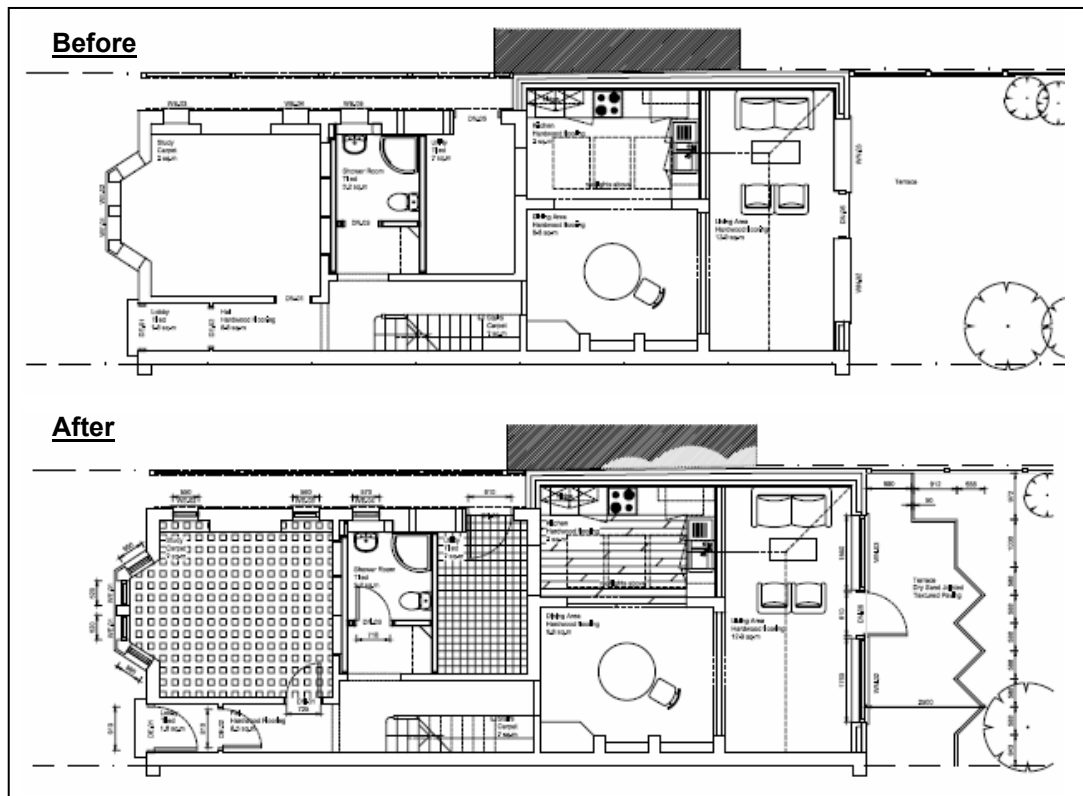
Before and after: The exercise involved detailing a typical UK floor-plan using common AutoCAD tools

Participants

The participants were typically working architects from Northern Europe, mostly British, but including a few from the Netherlands, Sweden and Denmark. There were ten AutoCAD 2002 users and ten AutoCAD 2006 users. The non-architects who took part were in occupations that work closely with architects, for example building services engineers.

> *Participant quote:*
>
> "*Although I'm an engineer by trade, this exercise is representative of everyday tasks*"

Results in more detail

As indicated earlier in this report, we found that AutoCAD 2006 users completed an identical design task on average 29% faster than 2002 users. The exercise was made up of 10 sub-tasks. Timings were taken for each of the individual sub-tasks as well as the overall exercise. The chart below shows how 2002 and 2006 compared.

Sub-task comparison
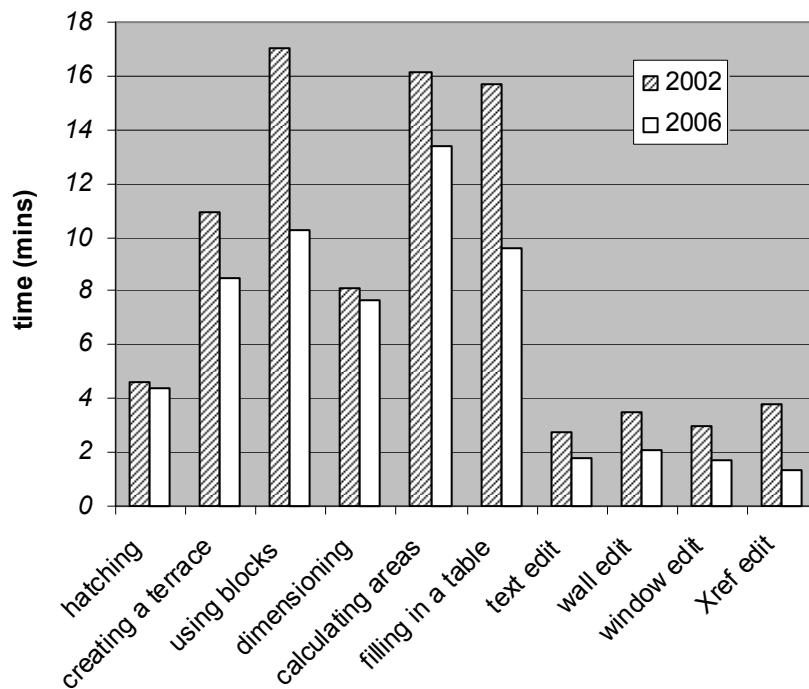
2006 versus 2002: 2006 users were quicker on every task

Big wins

Several new features stood out as providing the greatest gains for 2006 users. The use of Dynamic Blocks delivered a 46% improvement overall. They allowed the task to be completed faster and more enjoyably. All 2006 users are making regular use of this feature in their own work.

> *Participant quotes:*
>
> "*Dynamic Blocks … they make it enjoyable!*"
>
> "*I have authored 10 or 15 blocks and it allows me to create 100's of variations.*"

Additional big wins came from table improvements. The exercise made use of 2006's ability to support simple formulas in tables that automatically update values when drawing changes are made. New improvements to hatching also proved valuable.

Speed test

Taking a simple average across all participants, we found that 2006 users were 32% faster than 2002 users. However, this could be misleading. Some people are simply faster CAD users than others. For example, in this exercise the fastest 2002 user completed the exercise quicker than the slowest 2006 user.

We needed a handicap system – just like in golf. The 'speed test' was a group of tasks that could only be completed using identical commands in both 2002 and 2006. By timing users completing these individual routines we could determine if they were 'scratch users' or 'high handicappers'. We could then 'normalise' the results – effectively slowing down the fast users and speeding up the slow ones.

Here's how it works. If one participant completed the speed test in 40 seconds, but the average time for all participants to complete the speed test was 30 seconds we can say that user is 33% slower than average. To account for this we took 33% off the total time taken for that person to complete the exercise.

Even after 'normalising' the results, we found that 2006 users were 29% faster than 2002. No matter which way we looked at the results, 2006 was the clear victor.

> *Participant quotes:*
>
> "*This version of AutoCAD is truly a release for all designers, not just the CAD manager.*"
>
> "*[AutoCAD 2006] feels and looks better.*"

Discussion

So, you guessed it – there's no great surprise. We found AutoCAD 2006 makes architects more productive. But, what will upgrading do for YOU?

You could argue that the 2006 participants we recruited were enthusiasts. Since 2006 hadn't been around long by the time of the study, they were 'early adopters'.

Commonly, architects are under so much project pressure they can't risk the slightest disruption to their production. As a result some customers have to delay installing the product until work slows a bit, and that can sometimes be months. When they do finally install the new version there may be little time to learn the new features.

Architects need help to compare the risks of disruption with the rewards of greater productivity. Managers need help to understand how quickly the costs of upgrading can be recouped.

So, what productivity gains can YOU expect to achieve?

Upgrade strategy

To better understand how much more productive you can expect to be, identify yourself from one of the following user types.

| *User type*	*Typical upgrade characteristics*
"Sceptics"	*Believe what they have is good enough already.*
"Too-Busy"	*Leave the box on the shelf for a few months before finding time to install.*
"Accepters"	*Install on receiving, and possibly make some effort to see what's new.*
"Embracers"	*Proactive users who go on upgrade training courses to learn new features.*

Table: Likely upgrade strategies

In conducting this study we identified these four upgrade strategies. Each will result in a different response to the upgrade. They are independent of experience level. In fact, some of the most experienced AutoCAD users are the most resistant to change because they get comfortable working a particular way.

Having analysed the data from a wide variety of users we know that even relatively inexperienced users find the new 2006 features let them work faster. Using results from the exercise we came up with the following timeline.

Productivity timeline
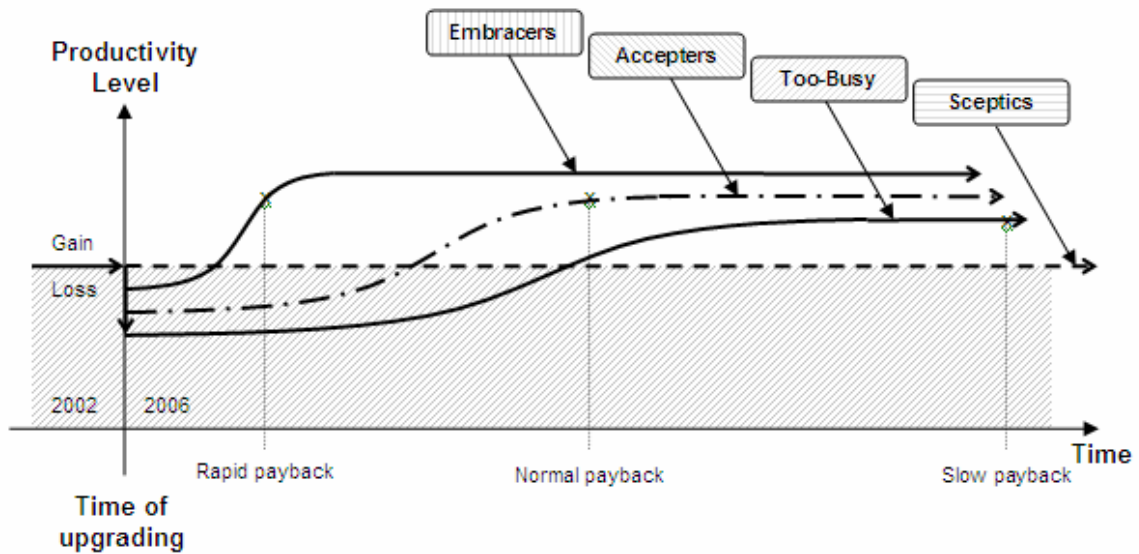
Timeline to success: How productivity changes after upgrading

The timeline shows the productivity outcomes of each strategy. These responses range from 'Sceptics' who achieve zero change, to 'Embracers' who achieve the maximum gains in the shortest time.

All users will lose some productivity during changeover. At the very least there will be some time required to install the upgrade. Users will need to familiarise themselves with the new layout, and investigate new functions. Your initial drop in productivity, then, is dependent on speed of installation, the amount and ease of migrating customization, and speed of learning.

The gradient of your learning curve depends on factors including how much time you spend using AutoCAD each week, your level of experience as an architect using CAD, and whether you are able to invest any time learning the new functionality.

Your eventual new productivity level is dependent on how much time you can invest learning the new software, your level of experience, and the amount of time you have to put the new functions into practice in your every day work.

ROI Generator

Take the test! See for yourself how much productivity you can expect to gain. Plug answers in to the following four simple questions to get an instant appraisal of your expected productivity curve and ROI.

-   What is your hourly rate? ($/hour)

-   What is your CAD usage level? (< 10 hr/wk, 10 to 20 hr/wk, > 20 hr/wk)

-   What is your ability level? (Beginner, Intermediate, Advanced)

-   What is your upgrade strategy? (Sceptics, Too-busy, Accepters, Embracers)

Conclusions

Cambashi conducted what we believe is a fair and independent appraisal of the productivity differences between AutoCAD 2006 and AutoCAD 2002 for a typical architectural exercise. The study had 20 participants, 10 of each, from a broad mix of backgrounds and skill levels. Participants agreed the exercise was a fair representation of what architects do on a daily basis.

The results, which took account of individual users' natural speed, showed a clear productivity gain of 29% on average.

We believe the reasons for this are simple: AutoCAD 2006 has a number of improved features that make common tasks in architectural drawing much easier. These include Dynamic Blocks, hatching and parametric table entries. Effective use of some of these new features, e.g. improved hatching command, need no training. More advanced features may requiring some background reading, but often dramatically improve the productivity of the architect.

The level of productivity gain you can expect to achieve depends on how you approach upgrading. If you are hesitant and unwilling to learn the new features then you are unlikely to achieve significant improvement in your workflow. However, if you are prepared to spend even a short time familiarising yourself with the new features you can achieve large productivity gains very quickly.

Correspondingly, the return on investment that you can expect to achieve depends on your usage level, skill level, upgrade strategy and chargeable rate.

The challenge is deciding how much you want to improve.

Appendix

The drawing used in the exercise was created by Annand & Mustoe architects (http://www.amarch.co.uk). A generic residential floor-plan was chosen as the subject to ensure that it could be easily understood by all architects.

Of the 20 participants, ten were full-time practising architects. The remaining ten were a mix of building services engineers, architectural drafters, CAD trainers, CAD managers, and one Applications Engineer. These users represented a wide spectrum of ages, abilities and levels of experience.

Approximately half of the participants were recruited through an Autodesk advertising campaign. The other 50% were recruited by cold-calling known AutoCAD users and explaining the purpose of the exercise.

In advance of the exercise, participants were emailed a package of information containing:

- the initial drawing file

- a list of commands that they were expected to be familiar with

- a set of general instructions for the exercise

- a PDF layout for guidance throughout the exercise

- instructions for logging on to the web conferencing software.

The exercise was an accurate reflection of the design tasks architects typically undertake on a daily basis. It made use of new AutoCAD 2006 features, but purposely steered away from making use of features introduced in AutoCAD 2005 and 2004, for example, Sheet Set Manager.

The exercise was made up of 10 tasks:

No.	Task	2006 command used
1	Hatching inner and outer cavity walls using a specified scale and hatch type.	Creating separate hatches
2	Creating and hatching a terrace area. The dimensions for the terrace were given on the PDF.	Specifying hatch origin
3	Using window and door blocks to insert into the appropriate places as shown on the PDF. A schedule for the newly inserted windows was then created.	Dynamic blocks
4	Dimensioning the new terrace area, doors and windows.	Using attribute extraction to create a schedule

5	Applying hatching to some rooms. Calculating room areas. Editing text.	Using 'PROPERTIES>Geometry' tool to find hatched areas
6	Creating a table and entering room area data.	QuickCalc
7	Entering and editing text.	Using 'Insert Formulas>Sum' command in tables
8	Editing a hatched wall and updating affected table values.	Automatic table updating
9	Editing a window block and updating affected schedule data.	Automatic table updating
10	Editing an Xref.	No new command.

One quarter of the exercises were monitored by Cambashi in a face-to-face session. Three quarters were conducted remotely monitoring activity over web conferencing software. This enabled every action of each participant's CAD screen to be observed and measured as they worked through the exercise. At all times a simultaneous audio link was maintained so that comments and questions could be dealt with instantly.

The overall time and the individual times for each task were recorded using a stopwatch. In addition, at the end of the exercise, participants were requested to give feedback on what they had done. All completed drawings were collected and archived for analysis and future reference.

NB: Computer processor speed is no longer a significant issue in productivity.