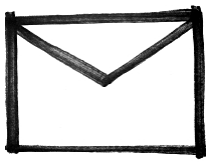

CAD comparison – A view from a Production Manager

by Niall Black, 7th July 2020 (Short read)

Trying to navigate a route through the choice of CAD packages is almost impossible and it goes without saying that there is no one answer. No, “Everyone should do this”. No, “I highly recommend this”. And certainly no, “This is the correct one!”.

Firstly, it’s all about you.

CAD as everyone reading this knows, stands for “Computer Aided Design”. Just think that through. This means it’s a tool for you as a designer, to help get your design thoughts collated together, with the help of a computer. It is not the solution to design. It’s a tool to help articulate what you want to do and hopefully provide some clear instruction (guidance) to others about what you would like to happen.

The reason, I start with this is because I think that in choosing a CAD package you need to answer one very basic question. Who is it for?

Many of the high end CAD packages have been developed not for theatre design but for the world of architecture, product design or engineering. They have incredible graphic engines that allow for high quality images to be extracted. So you can see in almost photo realistic ways your design before it’s created in real life.

What’s the problem?

Well. These packages tend to be expensive. Plus, to really get the best out of them, means really learning how to use them. Not just YouTube videos. Real, hard, lengthy, paid for teaching. From experience, if you cut corners in learning how to use these programmes you only use a tiny amount of what they are capable of.

Plus, you only really get great visualisation if you add ALL the info required. That means details about texture and lighting at every stage. Sure there are short cuts but every short cut reduces the quality of the final visualisation.

Then there is the hard truth that most others who you collaborate with don’t know how to use your CAD programme either. Or have a little knowledge but not enough. Or have a version of the programme that is too old to work with yours or an illegal copy which creates problems down the line.

Therefore, when making your choices, you need to balance:

- What is the best method of making your ideas clear?
- What allows for others to understand your ideas and allows them to interact.
- Which type of design presentation allows for others to collaborate and add their layers (and how important is that to you, genuinely)

- How important is it to you or the team that you are working with that you can provide, clear, precise information?

Here is a list of range of different delivery design methods and some of their Pros and Cons. Ultimately, the decision is based upon your reflection of the above questions.

One last thing to say. Is it better for you as a designer to provide clear information in an unfriendly format or use a friendly format that doesn't convey what you need? Different people that you work with will have a different response to that one.

Summary of CAD/Digital Design packages
Ok. Some facts, finally. I've used the phrase here CAD/Digital Design packages for a reason. My writing so far has definitely presented my opinion that the most important thing is for the designer to express themselves clearly. Secondly to package that information in a way that is useful for others.

Photoshop
Surprised to see that first? It's not number 1 in my head. But it has a place in this discussion. Many designers know their way around it and it allows them to create images quickly to share with others. It's clearly a useful tool when all you want to do is express your ideas quickly and be able to manipulate them without a huge amount of fuss.

In reality, what you are creating with Photoshop is visual references. Mood Boards. Suggestions for what things could be. Really helpful in conversations with others in the Creative Team but of virtually no use to anyone on a practical basis.

Cost	Subscription based. Currently £19.97 per month. You can buy and use for a while then stop.
Availability	Mac and PC. Online purchase
Ease of use	Easy to get started. Loads of features that takes time but relatively simple to get started.
Positives	Can make high quality images quickly. Play around ideas and share.
Negatives	You are making 2D images. That is all. Limited use other than expressing visual concepts.

SketchUp
I found this quote online "*For scenic design, I prefer Sketchup. For scenic construction, AutoCAD or Vectorworks.*
To a designer, it is next to impossible to beat how quickly you can draft up proof-of-concept ideas in Sketchup and spin the model around to look at it from different seats in your theatre, unconstrained from how the units have to assemble together piece by piece. It's fast enough that in a production meeting if the director asks you to try something you can bumble around on your laptop through the meeting and have something to show them and run past the design team an hour later."

I couldn't say that any better. It's basic but fast. Doesn't take long to learn. Has loads of limitations but that is why it's so fast and useful.

The major downfall is that going from a Sketch Up file to anything else is rubbish. Frequently I'm told all you need to do is export to a .dwg and you can get dimensions and all the info. It's not that easy. Trust me, I've tried many times. By default, it's quite an imprecise system. Dimensions can rarely be extracted accurately and when they do, the bigger picture doesn't come together so there is a period of recalculating everything.

Cost	Free entry level package. Pro version is $299 per year.
Availability	Mac and PC. The Pro version can be used offline which is pretty required.
Ease of use	Easy to get started
Positives	Great for showing designs in a virtual 3D world quickly. Easy to change and play with
Negatives	Torture to get from Sketch up to a higher quality CAD programme that builders and other designers could use.

Vectorworks

Many people suggest that Vectorworks is the theatre standard and the reason you are reading this is because you are trying to work out if it's worth the cost. I will declare that I have used for years. Perhaps 20 years. And I still don't know how to use it properly. You need training. It is also fantastic.

The good things about Vectorworks is that lots of people in theatre use it a bit. That means collaboration is usually quite good. Also, compared to AutoCAD you can draw things in 2D and 3D quite quickly. Once you have mastered the basics (and that takes a day or two) you can get quite far quite quickly.

The key thing about Vectorworks is that it allows for some precision but also allows you to do big rough clunky things at the same time. You can also cut and paste photos, pdfs into drawings all of which is unbelievable handy.

It spits out paperwork for others especially Lighting Designers who use "Spotlight". It really works for them. And if you are a set designer and have drawn your set in 3D Vectorworks, accurately, prepare to be worshipped by others. It imports and exports to AutoCAD accurately as well as creating good pdfs and visuals.

However. It's not that accurate. Countless times I've presented my seemingly accurate drawing to a builder who sniffs and says, "This has been drawn in Vectorworks. The dimensions aren't accurate. You are a few mm out on that line." Seems childish I know but that level of precision can be important for someone at some stage.

There is also a constant feeling that you are simply using about 10% of what it can do. Vectorworks is used by all type of non-theatre designers so you discover all kinds of functions that you would never use. From landscaping to M&E layouts. And even if that was useful, I can guarantee that no architect or engineer you go to will accept you Vectorworks drawing. They want it in AutoCAD using all the correct symbols and conventions that a trained draughtsman would use.

Vectorworks is, in reality, the default theatre CAD package in the UK. It comes in various variants and Lighting Designers and Production Managers tend to use the "Spotlight" variant. Other designers may choose the "Designer" version. You can trial before you buy. But. It's expensive and if you don't intend to fully commit to learning it then be cautious. You can always pay a freelancer to do your drawings for you!

Cost	Currently £2,053.80 inc VAT for Spotlight (can be closer to £3k sometimes but like DFS, there is always a sale on if you wait a month or two). Service Select Package £453.60 per year for updates etc
Availability	Mac and PC. Buy through 3rd party companies.
Positives	Lots of people in the industry use it. Has become the default CAD package for many lighting designers. Can create basic drawings very quickly that can be easily shared Lots of informal online help Seems to be able to communicate with everyone using their own type of files. Creates paperwork
Negatives	Very expensive To get beyond basic usage training is required. Has a level of imprecision about it that engineers and builders tend not to like.

AutoCAD

You might think that with all the chat about builders and precision that AutoCAD is the one. The perfect, precise, universal CAD package. And it is. If that is what is important to you. It is the standard. It's like Microsoft Word. Everyone somehow can integrate with it.

The problem is, it's a bit like Microsoft Word. It's a bit, well dull. It looks like an engineering tool because that is what it is. It's lots of lines and typing of instructions. Using it can sometimes feel like playing a 1980s computer game. Plus when you first start using it, it can feel completely baffling. So un-intuitive.

Go online and you will see amazing renders created by AutoCAD. However, most of them will be product design not theatre design. Ultimately, if you imagine a sliding scale of design tools which has a picture of Jackson Pollock at one end and James Dyson at the other end well AutoCAD is at the cleaner end…

That all said. Practically, builders who do CAD use AutoCAD. Draughtsman who draw for theatre draw on AutoCAD. Nearly all programmes that feed from CAD programmes to help them do things work with AutoCAD. It is the standard. It gives precision. It's just not as pretty.

Cost	You can buy for a month at £234 or for a year at £1,890
Availability	Mac or PC (though some functions only on PC)
Positives	The original CAD package. Precise. Expert. The one the pros in the building and engineering world. The world uses it. Chances are, if you draw in any package, you can send your .dwg file and people will be able to read it.
Negatives	Expensive Not particularly intuitive and takes a while to get to know how to use it. Doesn't have a great graphical user experience

Rhino

This is a package that has gained some traction over the last year or two and some notable designers are adopting it. It is even more graphical than Vectorworks. You can apply loads of textures and present your idea as high quality visualisations quite quickly.

It's a very powerful, super maxed Sketchup allowing you to turn on and off layers, adjust, whizz around, different view etc. It exports to AutoCAD and other file formats and you get viewers so it's easy to collaborate. It's a really amazing 3D focused CAD programme with brilliant features and visualisations.

And it's cheaper than Vectorworks and AutoCAD. There is loads of online help and it's clearly a major new player in the world of design software.

So what is the downside. Well. If you remember my scale from before (Jackson Pollock to James Dyson) this is clearly well placed on the Jackson Pollock side. Which is ironic for a piece of design software which has really been created with product design in mind.

There is that ongoing issue that it is not quite as precise as many other users need. From it you can create 2D and 3D drawings and export to all sorts of things. But from experience, I have had to spend quite a bit of time tidying up Rhino exported drawings.

That said, I think it has the capability of precision but it also has the capability of being very quick to manipulate things. And like in Vectorworks, the ability to work quickly usually means a bit of precision goes out of the window.

The other thing I have noticed with it has been that other potential users (Production Managers/Lighting Designers) seem less keen on it and tend to extract info from it and then use Vectorworks

Cost	€995 for single user licence
Availability	Mac or PC
Ease of use	More complex than SketchUp but less complex than AutoCAD
Positives	Built for 3D. Creates fantastic 3D images that can be manipulated and shared. You can work fast and export to various formats
Negatives	Built for 3D. Want to do a super basic drawing? Harder than you think. It's a whole new way of life. Limited knowledge of it within the industry. So you could either be an early adopter or a renegade with a CAD programme nobody else uses….

Solidworks

I'm going to confess. I can't find anyone that uses it! Which is odd as it has a name you have heard of and a massive online profile. Obviously someone uses it and it stands to reason that someone in theatre uses it. I just can't find them.

I read a bunch of articles about it and looked at videos of what it can do and I can honestly see no reason why it is not used in theatre. It's a relatively low cost, well supported CAD package that does 2D and 3D and everyone says it's quite easy to learn!

It clearly has a bit of a reputation as a programme for engineering and product design which may make it less attractive. Also, in theatre we tend to follow a trend that starts up and we listen to our colleagues. So the fact there is no great existing theatre fan club doesn't mean it's not suitable. It's just, not, well, ours.

Also. It only works on PCs. And that could be the big reason.

I called up the Scottish supplier and quickly realised why it's not used in theatre. It's very, very expensive. It also does amazing CAD things but things that are perhaps not as useful in theatre as in say product design. It works out all your parts and gives a kit list at the end of the drawing. You can draw a 3D internal combustion engine and then test if it will actually work! It's incredible and if you were designing for the oil industry I'd say get it.

Cost	Standard version is around £4000 (deals available) plus annual subscription of £1745
Availability	PC only
Ease of use	Apparently after 4 days training you are flying
Positives	Super powered CAD package. Brilliant 3D. Great support
Negatives	To be truthful it's for engineers and product designers. Expensive.

3ds Max and Cinema 4D
We are back into territory closer to Photoshop but 21st Century, super duper Photoshop. I'll keep these brief and lumped together even though they are very different packages.

They are not really CAD packages for doing a nice plan to give to someone. It's software where you can create 3D objects and environments which you can then explore, manipulate and share. If your goal is to provide fantastic "renders" of your environments then look at these bits of software.

It is becoming more common for designers to create a 3D render detailing the splendour and detail of the design. It allows for lots of small 3D objects to be collated into one larger environment. I've witnessed designer who create large touring concert sets and those on large intricate musicals have used these packages. The outcomes are rich images based on accurate lighting situations. Hugely seductive.

3ds Max was created by the same company that created AutoCAD. As a programme it's
been around over 30 years though the technology has improved infinitely since it started. Its strapline is "3D modelling and rendering software for design visualisation, games and animation"

Cost Subscription £234 per month or £1,872 per year inc VAT
Availability PC only

Cinema4D is the one which I am aware more theatre designers use. This is probably due to the Mac compatibility. Also, if Rhino is a beefed up SketchUp, then Cinema4D is Photoshop on steroids.

It's used extensively across the creative industry to make 3D worlds. If you know anyone working in video then you will have heard of After Effects. Cinema4D is the grown up sibling. There seems to be loads of online help and I think you can find a good amount of theatre peer support.

Cost Subscription £55.19 per month (if you sign up for a year) or solo month £96.99. You can buy a perpetual, never dies licence for £3,300.
Availability Mac or PC