

Madeline, the muse at the heart of Cages, looks like an actor on the stage but is actually a pin-sharp projection.



# HIGH TECH TROUPE

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**Few forms of entertainment are as old as theatre. Thought to have originated in ancient Greece, theatre is still going strong today in largely the same format. Maybe not for much longer. Theatre is transforming and AV is the star of its latest act.**

*By Caroline Reid and Christian Sylte.*

**O**ver the past two millenia, theatre has survived wars, famines, industrialisation and countless natural disasters. However, just three years ago the curtain nearly came down on it.

Covid didn't just close the doors of shows around the world, it made it tougher for them to stay open when the dark clouds began to clear.

All it took was for key cast members to catch the deadly virus and shows could be cancelled at the last minute. Theatre has changed so little over the years that it lacked redundancy measures to deal with a disease which could take out the cast and their understudies at the same time.

One show had a solution and, ironically, it was just starting to gather steam when the pandemic struck. Called 'Cages', the stage spectacular launched in Los Angeles in late 2019 and is set in a dystopian world where any kind of emotion is forbidden. Everyone's hearts are locked in cages, hence the name of the show.

When a recluse named Woolf finds himself falling in love for the first time with a pixie-ish muse called Madeline, he attempts to put the world to rights. The Chemist, an avuncular father figure tells Woolf that only he can save everyone and music is the key to doing so.

Unsurprisingly the show is the brainchild of two songwriters. Benjamin Romans and CJ Baran started writing the music that came to be Cages in 2014. They specialise in dramatically different

styles as Romans comes from film composing whereas Baran has more of a techno background.

After meeting at a bar, they found common ground in left-of-centre pop music and discussed how it could fit into a theatre show. Cages was born.

## It's not 'Les Mis'

The bohemian tale is the backdrop for a series of songs but they aren't the beltlers you would expect to find in a stage show. Instead, these orchestral numbers have a thumping bass and a punchy beat thanks to Baran's influence. It's not 'Les Mis' and

there is good reason for that.

The music complements avant-garde visuals which look like they would be more at home in an episode of Star Trek. The acts range from duets to dancing and eerie animation projected on to a screen in the background. So far, so normal and that's exactly what the producers intended.

When the show's London run began in autumn 2022 even eagle-eyed viewers didn't realise that a number of the characters are virtual. This trick is used to breathtaking effect at one point when the actor playing Woolf performs with a holographic doppelganger and appears to 'step out' of his own body.

"These are filmic tricks which are made possible in the cinema by CGI but can't usually be seen on a live stage," says Anthony Lilley, co-founder of Scenario Two, the theatrical production company behind Cages' London run.

The tricks are driven by new developments with the technology which powered the recent ABBA Voyage virtual concert. However, whilst the visuals in that show were produced by Industrial Light & Magic, the special effects powerhouse behind Star Wars, some of the virtual characters in Cages were scanned in using an iPhone 13 and free software.

Known as MetaHuman Creator, it is made by Epic, the software company behind the Unreal series of video games. MetaHuman allows users to quickly generate photorealistic virtual people and make minute adjustments to their appearance to ensure that no two are the same. Cages was the first live show to use Unreal technology and it has

  
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 Scenario Two**

paid off.

"The most common questions we're asked after the show are about which scenes have real actors playing Madeline and The Chemist and which ones use holograms. In fact, there are no actors on stage playing those characters - they are always holograms," says Lilley.

They say that necessity is the mother of invention and that is what drove Scenario Two in the direction of this technology. When Cages moved to London, the original cast members couldn't all perform there throughout its run so the producers needed replacements as well as new digital counterparts for them. The most crucial character to replace was the lead star Woolf and Scenario Two only had a matter of weeks to pull it off. They were against the clock as the London run was announced in August 2022 and began just one month later.

"Producing a system which allowed us to replace the digital version of the lead actor with that of an understudy or alternate performer very quickly required us to use motion capture combined with 3D games software from Unreal," says Lilley.

### Motion capture choreography routine

The virtual version of the new lead character was nicknamed DigiWoolf and Lilley's team went to great lengths to ensure that not only does it look identical to its human counterpart but it also precisely follows the choreography routine.

"The team developed DigiWoolf by filming the movements of CJ Baran (who played the original Woolf character in LA) in a motion capture studio. The movements are precise to the show's segments where he must simultaneously interact with his 'unreal' self (the realistic avatar) whilst appearing on stage.

"The team scanned the faces of the alternate Woolf and an understudy using a piece of software and an iPhone 13. Scenario Two then used Epic Software's newly released MetaHuman tools to create a virtual face and hair for DigiWoolf ready to be grafted on to the body they'd already motion captured." All that remained was for Scenario Two to render the revised scenes into a new playout file so that it could be projected during the show.

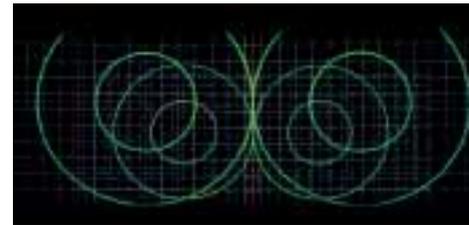
"This technology has reduced adding a new actor to this very advanced show to a matter of hours (not the months it would take to train an understudy)," explains Lilley. This could be a godsend if Covid keeps cast members at home in future as new actors could be scanned in and mapped on to the existing choreography routines in no time at all. Alternatively, the virtual performances of the ill



Cages combines traditional theatre props with high-tech holography.



It's easy to see why so many viewers aren't aware that Madeline is actually a hologram.



Green rings are part of the process of calibrating the Cages screen.



A suite of monitors in Cages' mission control with the sound from Yamaha, Sennheiser and L-Acoustics racks.



PHOTOS © JANE HOBSON

actors could continue even if their human counterparts are actually in lockdown.

It also saves on purchasing physical sets as holographic projections replace them in a number of scenes. "In effect, we can create filmic scenes and effects live on stage and these appear to be in 3D - such as the sea in the song 'Lighthouse' or the 'jump cuts' in the sequence 'Love Song' which can't

usually be done on stage."

The physical sets that are used in the show weren't even shipped to London from LA. Instead, the team scanned in the entire stage and the props using 3D augmented reality technology. The files were then sent to UK suppliers who replicated them at the correct scale for their new home. This innovative use of tech cuts costs and enables the

show to go on even if borders are closed.

"We've been calling it 'future theatre'", said the show's American producer Ian McEvily to the LA Times newspaper. "We really think this is what theatre could look like in the future." It is no exaggeration.

Some of the technology that Baran and Romans required didn't exist when they began planning Cages. They had to wait for the AV industry to catch up with their vision putting them in a tricky situation when it came to reassuring investors.

"The integration of holographic visuals with live actors and 2D UHD projections is very rarely seen outside tech demos and lab environments," says Lilley. The technical wizards behind the holographic effects are LA-based Prism Hologram and Musion in London.

Although Lilley will not say how they pull it off, the effect is believed to be an advanced Pepper's Ghost which is a theatre illusion technique dating back to 1862. It involves brightly-lit hidden objects being reflected on to a pane of glass seen by the audience in a dark room. The audience can't see the glass so the reflection on it appears to float in mid air.

### Music gig control system

In Cages, the effect is powered by four Creative Technology laser projectors hooked up to a state-of-the-art show control system which is more commonly found in major music gigs than the London Off-West End scene. It synchronises the 19.1 audio setup which consists of 60+ speakers rigged to surround the audience even from directly above.

"The audio was mixed in LA and then reworked for London by a specialist team from L-Acoustics who are partners of the show and provided both their L-ISA technology and the services of members of their team," says Lilley.

"Ensuring that the holograms remain in focus in a very high volume audio environment requires a particular technology which is extremely leading edge and patent-protected," he adds. "Using video or holographics in 3D space alongside live performers coupled with 3D immersive audio is the biggest challenge."

It is particularly impressive given the relatively small scale and comparatively low budget of Cages which is believed to be just north of \$4 million over ten years. It has had a magic touch.

Lilley says that the "main feedback we get regarding the technology is that Cages is unlike anything people have seen before in the way it combines the live and the digital, the real and the



Anthony Lilley, the wizard behind Cages' London run, inspects the soaring stage (below). He's surrounded by some of the surreal scenes created by the high-tech hardware behind the scenes. in Cages



unreal. "Whatever people think of the piece itself - some people love it and for others it's not their cup of tea - we have had uniformly brilliant feedback for the quality of the visuals, design and sound and for the innovation and imagination with which the show is put together." There could be much more to come.

Lilley says he thinks the technology will be "a springboard for more hybrid performances in future and could herald the arrival of even more realistic virtual actors alongside innovative staging and visual effects." It would give the theatre industry a backup plan if there's another pandemic and would mean that the show will go on. ■