



Left: Rehearsing with the 75ft Technocrane  
Right: The cast rehearse the Busby Berkeley scene with the 50ft Technocrane

## One-shot wonder: #BRUM

GTC member and multi-award winner DoP **Nat Hill** describes the remarkable one-take shot that transitioned the Commonwealth Games from this year's hosts, Gold Coast Australia, to the 2022 host city, Birmingham. Nat masterminded and lit this incredible shot that lasted more than 6 minutes, moved from interior to exterior, raced alongside, through and around hundreds of performers at breakneck speed, rising at two points to more than 75 feet to capture spectacular high angles. This was a truly daring and innovative piece of shooting, made all the more challenging by being broadcast live! If you haven't seen it yet, the shot can be viewed at: <https://www.bbc.co.uk/news/uk-england-birmingham-43755833>.

**B**irmingham was selected to host the 2022 Commonwealth Games in December 2017. As is the tradition, it was expected that the handover from the 2018 hosts, Australia's Gold Coast, to the UK's second city would be represented creatively as part of the closing ceremony on 15 April.

The concept for Birmingham's handover was to move seamlessly between Australia and Birmingham. The idea was to have a local Birmingham artist perform one of her tracks at the closing ceremony and then cut from a wide shot of the stadium applauding in Australia to a close-up in Birmingham's Town Hall, where we would match the conditions to simulate the Brisbane stadium. A two-minute poem would then be recited by internationally renowned British poet Ameerah Saleh and, at the culmination of the poem, she would lead the camera and viewers out through the doors of the Town Hall to reveal, like magic, that we were actually in sunny, colourful Birmingham! The camera would then follow a choreographed performance to ELO's 'Mr Blue Sky' with volunteer performers selected to demonstrate local diversity, energy and vibrance.

### Planning begins

So in the first week of March and supposedly the start of a 'beautiful British spring morning', I found myself in the middle of Birmingham's Victoria Square with director Chris Howe, the Progress Production team, and the event executive producer, Martin Green. The only trouble was there was icy snow and we were being whipped by a freezing wind! The conversation was a bit disjointed as we jumped up and down to keep warm but, even so, the excitement rippled through the group as we began to discuss Steadicam running out of the Town Hall, being chased through the square, into the Council House lobby, then flying over the Victoria statue, dropping down to reveal more performers, and eventually rising high again to reveal #BRUM being spelled out from above.

It was to be an ambitious but undeniably exciting shot that would last between 6 and 7 minutes – and it would happen live to the world in just a month's time. My first thought was: "I hope it gets a little warmer or the volunteers and dancers are literally going to be dancing on ice!"

### Steadicam or gimbal rig?

For a long time I had been hoping to do a single-shot piece using a gimbal mount. I was aware that removing the camera from a two-point rope rig or fixed arm crane had been done in commercials and films, but never to my knowledge live on TV. This was my chance to make it happen and I felt it would be the best way to capture all the exciting ideas we were throwing at the 'Commonwealth Brum' handover live insert.

Thankfully, everyone trusted my idea. Now it was up to me to make it happen! No pressure then. There were a few questions being asked – specifically, what would our backup be if the camera went down? What camera could we go to if we needed to? Put simply: there was no backup to cut to. A dance number and concept like this is all choreographed to one camera and there simply isn't an option to suddenly cut to four or five other cameras in the square covering the same routine. So, I was effectively putting the production in a 'do or die' scenario. The best we could offer would be to record the dress run and have that on EVS running in parallel – and this is what we did. Brisbane ran our dress run footage and we did too simultaneously, so if the worst should happen, either we or Brisbane could cross-mix to the recorded footage. Thankfully, the live take was our best and went almost perfectly. I say *almost* because there are always things we spot that we wish we could have done better...

Anyway, back to the camera package. The biggest challenge when attempting to present this idea before has been finding a lightweight gimbal rig that could take a broadcast camera with a wide-angle lens. A question I have often asked myself is: "Why Steadicam, when a gimbal rig can offer such a wide range of shots?" The main answer is fairly obvious. Weight. Holding a 15kg camera rig without any support vest gets exhausting very quickly, therefore it's not practical for TV work where we rehearse all day and shoot live that night.

The next question I have struggled with is: "What rig will be able to take the weight of a Sony P1 camera plus Canon HJ14 or similar lens?" These longer-form lenses make it difficult to balance a gimbal rig because the rig becomes very front-heavy, unlike the stubbier PL-mount short zooms or primes.

However, the manufacture and design of these rigs has improved dramatically over the last year. As recently as January 2017, I was speaking to various companies and still being told it would be too difficult to counterbalance this kind of broadcast setup. But suddenly rigs like the Sachtler Artemis Maxima started to appear that will easily counterbalance any camera setup. The Maxima is based around a central ring with strong motors that can control a heavy load.

Finally, I needed the stabilised head to be light enough to carry for long periods of time, plus have the ability to work like a remote head when on the crane, with a familiar joystick control for my crane head operator, Matt Ingham.

Thankfully, a few chats and visits to Motion24 (M24) provided the perfect solution. They have the relevant broadcast knowledge and understood what was needed to make the camera package fit on their customised MoVI Pro. In addition, they had designed and built a mount that would be perfect for mounting on and off a crane – the Griphaus ShotDock System. This is a shock-absorbed mount that works with a trigger to easily release or dock the MoVI during a shot – a clever and neat bit of kit that gets one's inner geek all overexcited!

There was one small stumbling block though; M24 only had one ShotDock and to do what I was planning we needed at least two mounts. Reassuringly, they said a second dock could be made within 2 weeks. The ShotDock was far superior to any alternative electro-magnetic system and both Craig Porter and James Davis at M24 were experienced in executing these kinds of shot. We were in safe hands.

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### In out, up down and all around!

For the broadcast, the camera needed to travel both inside and outside the buildings around Victoria Square in Birmingham's town centre. It also needed to move very high to achieve the best coverage of the dance choreography. The director, Chris Howe, basically wanted to achieve the impossible. Raise the camera up onto balconies, go through a window and then back out and down to ground level, travel at sprint speed, appear to hover over a statue for a Busby Berkeley moment, lead a floating cast across the square and, last but not least, literally make the camera jump through hoops! Almost every other day he would ring or text me with a suggestion: "What if...?" or "Is it possible to...?" I think we managed to achieve most of his original vision and of that I am very proud.



It was not without its challenges though. In a situation like this, the camera almost becomes the lead dancer, with all the cast members following. If the camera were to go wrong, not only would the coverage fail at that point, but it could also throw the performers off. The entire piece could very quickly fall apart. I was fairly confident about managing all the technical challenges as long as the camera was part of the choreography and not slowing the dance down.

I was also concerned that we didn't make Birmingham look like an enormous building site. Every direction you looked from the square there was work going on: 200ft high cranes, hoardings covering huge holes in the ground and scaffolding covering half-built structures. "Birmingham has to look magnificent!" exclaimed Martin Green, the event's executive producer, who in 2012 had been responsible for the London Olympic Opening Ceremony. "No problem," I replied, following that with a very quiet "Help"! I knew that, among many other considerations, I would need to take this into account in our coverage of the choreography and even encourage some of the dance to be staged in parts of the square where we could be sure to limit filming towards the building sites, or even arrange to use the cast to hide parts we didn't want to see.



MoVi op James Davis hands off to the 50ft Technocrane

### The heavy gear

To achieve the shot, I decided we would need two large Technocranes and a tracking vehicle. Usually for something like this you would use a site plan to work out shot sizes and grip requirements. Unfortunately, Birmingham didn't have an elevation plan of the square, so my key grip Alan Tabner and I ended up measuring as best we could to try and determine what crane sizes we would need to get high enough over the Queen Victoria statue to see the Busby Berkeley moment clearly and then a second crane to get the camera high enough for the end shot. You can only be so confident about these kinds of calculation though. As much as you plan for the perfect shot, there are always going to be elements that can restrict you. Would the end shot be better on a 100ft Vortex Towercam, for instance? Was a handoff onto a drone possible or could we get the largest Technocrane in the world?

We decided that Technocranes would give us the most flexibility, so I contacted Technovision and asked them to supply us with a 50ft and a 100ft Technocrane, crossing my fingers that these would be available. Unfortunately, 'Wolfie' and 'Diesel' at Panavision explained that the 100ft crane no longer exists and the largest Technocrane available in the world is now the 75ft. This was bad news. I needed as much height as possible to get the end shot of the performers spelling out #BRUM and for it to be clear enough that it wouldn't look like it was spelling something else!

This part of the shot needed to be as high and central over the town square as possible, but the available crane would only reach to 25 feet lower than we had calculated was necessary. Ultimately, it would not be possible to achieve with a crane. Although a consideration, I didn't want to rely on a continuous camera transfer to a drone because this would be too weather-dependent and potentially dangerous. Other options we explored weren't workable either. In the end, to achieve the overhead shot for the final few bars, we decided we would forgive a single cut in the entire piece for the payoff and secured a drone from Flying Pictures on the week running up to the shoot to make this happen. I hope this is an excusable cut after such a very long shot. The two cranes each had one small but crucial moment to cover and Matt Ingham, the crane head operator, and Alan Tabner's grip team both did an incredible job under pressure.

### Choreography and limited rehearsals

Rosie Kay was the choreographer of the whole piece. We constantly threw challenges at her to make it work for the camera and also to get the most out of the dance movement. She coped with our demands incredibly well. Rosie not only had to teach 1000 people to dance in less than 2 weeks, but also had to make the choreography fit to the timings of the track and synchronise the movement to the camera. Most of our dancing volunteers were not trained professionals and hadn't been involved in any kind of camera setup before, but they were all very focused and hopefully enjoyed the routine as much as they seemed to.

To help with the choreography and make sure we had enough time to perform the routine around the square, we blocked out and filmed the dance with eight of Rosie's dance captains. They performed each section while I filmed on my Canon 5D, with the crane shots slightly improvised. I was then able to 'stitch' the coverage together and the routine worked brilliantly to the track. It really helped us mark out where the problem areas would be and what we could do to make our lives easier.

One of our camera tricks was a section where the camera moves through some hoops. This was achieved by having a

### The kit

- 1 x Sony HDC P1 camera
- 1 x Canon HJ14 lens
- 1 x MoVi Pro gimbal with custom accessories supplied by M24
- 2 x Griphaus ShotDock System
- 1 x Preston MDR3 lens control system
- 1 x Nano RF link
- 1 x 50ft Technocrane
- 1 x 75ft Technocrane

### The crew

11 x grips: 5 per crane and 1 guiding the camera. Key grip: Alan Tabner

1 x tracking vehicle driver: Neil McKay, from Anglo American Tracking Vehicles

1 x Technocrane head op: Matt Ingham, who operated the MoVi remotely when it was on the crane and if we needed this at any other points around the square

2 x MoVi ops: James Davis and John Clarke

1 x focus puller: Warren Buckingham, who also had control of the zoom

1 x MoVi technician: Craig Porter

1 x standby camera op: Gareth Beeson

3 x Flying Pictures drone team including: pilot, head op and technician

Full OB truck rig supplied by CTV, with Nick Dyer as unit manager, plus vision engineer, RF engineers from Broadcast RF, cable riggers, gallery crew, sound etc.



Flying Pictures drone takes off ready for the rehearsal

The first time we had all the cast on site was the day before the live transmission. The day previous to this we had rigged all the camera equipment and tested some of the transitions with the dance captains. Blocking out some of the sequences became very useful in preparing us for our only rehearsal day with the whole cast.

The full rehearsal day was long and exhausting for all concerned, especially the MoVi operators, James Davis and John Clarke. At times they would share the load of the rig to help move the camera fast enough and at other points to create a particular effect, such as the hoops. However, for much of the shot, James had to operate the 'beast' of a camera on his own. He had been training for weeks to prepare himself for the 17kg load, but after four complete run-throughs and several blocks of transitions, we had to conserve his energy. Even though we hadn't once nailed the performance, and there had only been one full rehearsal with the complete cast including the ballerinas, our worry was he wouldn't be able to do the two planned dress runs and then the live performance the next day. Each performance was particularly



MoVi op James Davis on the tracking vehicle with the cast chasing him





Some of the team, L-R: Alan Tabner, Peter Munce, Adam Slater, Ryan Turner, Stacey Hancox, Matt Ingham, DoP Nat Hill, with (in the front) *Blue Peter* presenter Radzi Chinyanganya, who took part in the performance

gruelling and you could see this from his face as he came to the last transition and handoff on to the 75ft crane. I was very relieved it wasn't me operating the rig – although secretly I was desperate to have a go!

James says: "Working with Nat and the rest of the team was a fun process from start to finish. Even with past experience of performing technically complex MoVI shots, after hearing the brief for this job – the sheer distance we needed to cover, along with the amount of complex operating techniques we would be combining into one continuous take – we took no chances in preparing extensively in the run-up to this job. Nat was fantastic at looking after the camera team, helping to nail down the blocking/choreography, managing the massive lighting task ahead of him, while still finding time to make sure we had everything we needed to get the job done creatively and safely."

Special mention also goes to Craig Porter, our MoVI tech from Motion24, the whole camera and grip team for their incredible work, and our two other superb camera operators, John Clarke and Matt Ingham, who both worked tirelessly to help make this feat of camera movement possible.

### Lighting both interior and exterior

Lighting the sequence was also a challenge for myself and the gaffer, Gareth Crockford. I knew from the start that I couldn't use normal levels of light for the interiors as I couldn't afford the luxury of a five or more stop pull on the iris as the camera went from interior to exterior and vice versa. So I aimed for roughly a two-stop difference between inside and out. In tight spaces, corridors and large areas that I wanted to keep colourful, this became a challenge. For example, at the beginning of the piece, we find Ameerah Saleh reading her poem in the Town Hall. On camera, this mimicked the night-time conditions in Brisbane. In reality, we had all the blackout blinds open, I added three 10kW Fresnels and the house lighting rig was either bounced into the roof or pointed directly at the areas we needed to light. In addition, Ameerah had a spot directly on her, which was so bright it made you squint (she did incredibly well to cope with the brightness of the sharp spot). On first look, production asked several times "Is this really how the room is going to look?" It was quite confusing until you saw it on camera.

Throughout preparation, I was secretly hoping for an overcast day, while everyone else on the production and event team were praying for gloriously sunny weather. Although lovely for our volunteers, a sunny day would have brought with it many problems. Along with the issue of huge shadows, it would have added up to another four stops on the iris when the camera was outside, which I couldn't compensate for on the interior. Rain would have been an absolute disaster too. We all found ourselves checking the weather hourly to see what would be happening at the exact time of the broadcast. It almost became an addiction. Four days before the live broadcast, and with thick fog hanging over the square, we decided to order in two Musco lights, which would be with us and ready for the Sunday. These are trucks with their own generator, a 150ft crane arm and almost 100kW of light each. They helped to lift the level of light slightly on the square but, more than anything, gave the cast a slight kicker. Although great, this also introduced its own problems. We were filming 360 degrees, so there was no 'safe area' to position the lights out of shot. I also had to try not to create shadows from the two Technocranes. By the time the lights were set up, we had already fixed our camera positions and decided on the camera moves, so it was going to be a bit of a compromise.

Typically, the rehearsal day was gloriously sunny, while for 'show day' it was due to rain! Thankfully, my prayers were answered and the weather was overcast and dry for the live broadcast to more than 1 billion people around the world. Just 30 short minutes after we were off air, during the derig, the heavens opened and it poured down with rain. We got lucky.

The project was a huge accomplishment by everyone involved, showing what can be achieved in such a short space of time with planning and good decision-making. I am told that this was a live TV first – a single shot across two Technocranes, a tracking vehicle and a lot of running. We all went home lighter than we arrived, some due to physical exertion and others as a result of stress – but it was worth every sleepless night and a privilege to be a part of something so special.

Since then we have had fun with another complicated one-shot wonder – this time for YouTube as part of its largest ever commission, *Training Days with Jack Whitehall* (you can see the shot here: <https://youtu.be/VwA8LS9or5I>).

### Fact File

GTC member **Nathaniel Hill** is a Director of Photography who is commissioned to work on features, dramas, commercials, promos and episodic TV.

His extensive knowledge of working with both single and multicamera, VFX and complex lighting setups, has allowed him to work with some of the biggest artists in the world, while his strong visual aesthetic has helped to create many award-winning productions. He has received several GTC Awards for Excellence – for *Sound of Music Live*, *Jonathan Ross Show*, Coldplay's *Mylo Xyloto* DVD and Alan Carr's *Chatty Man*.

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