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LSi Exclusive!

Isles of Wonder

Behind the production of the Opening Ceremony of the London 2012 Olympic Games . . .

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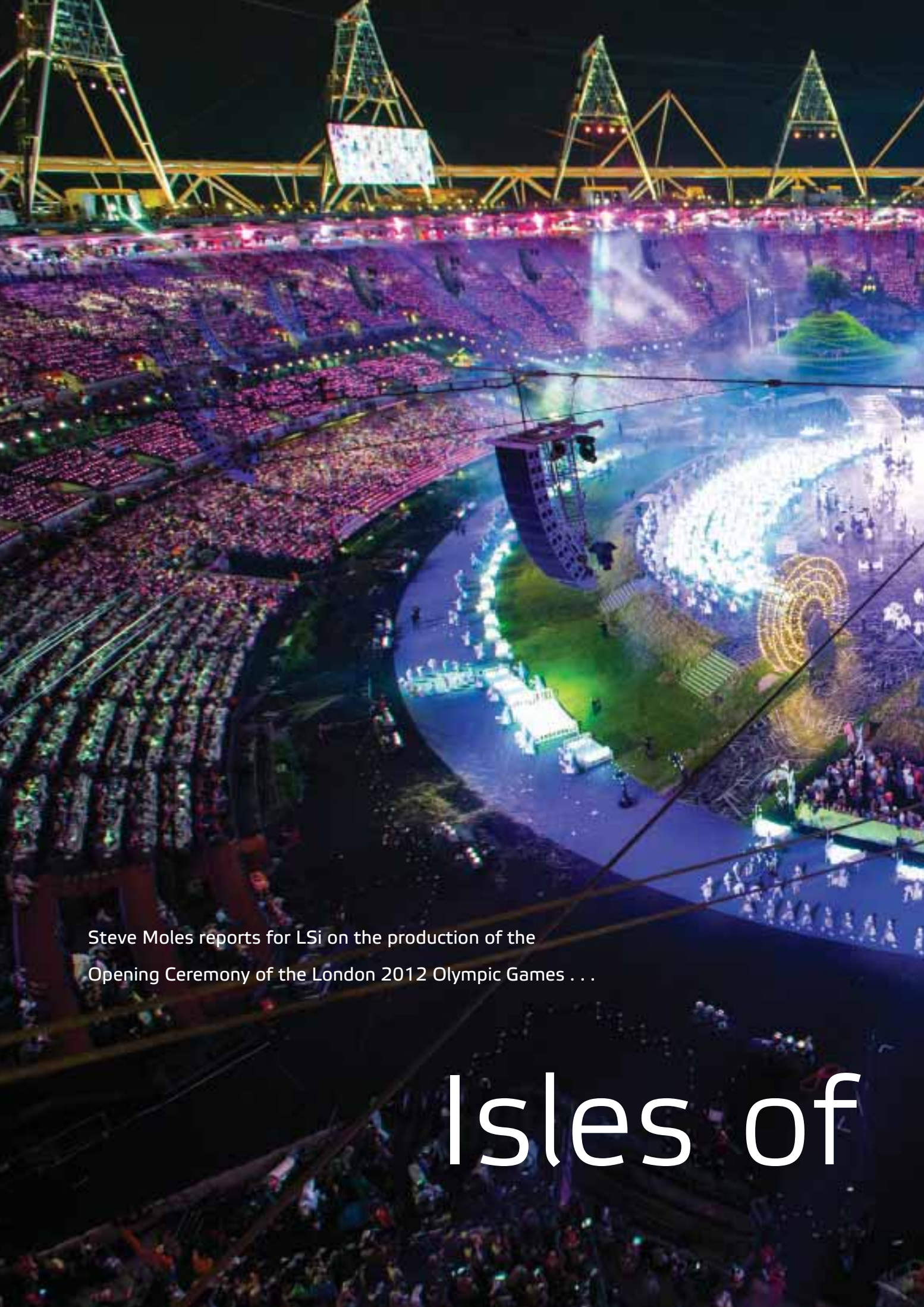

Steve Moles reports for LSi on the production of the Opening Ceremony of the London 2012 Olympic Games . . .

Isles of

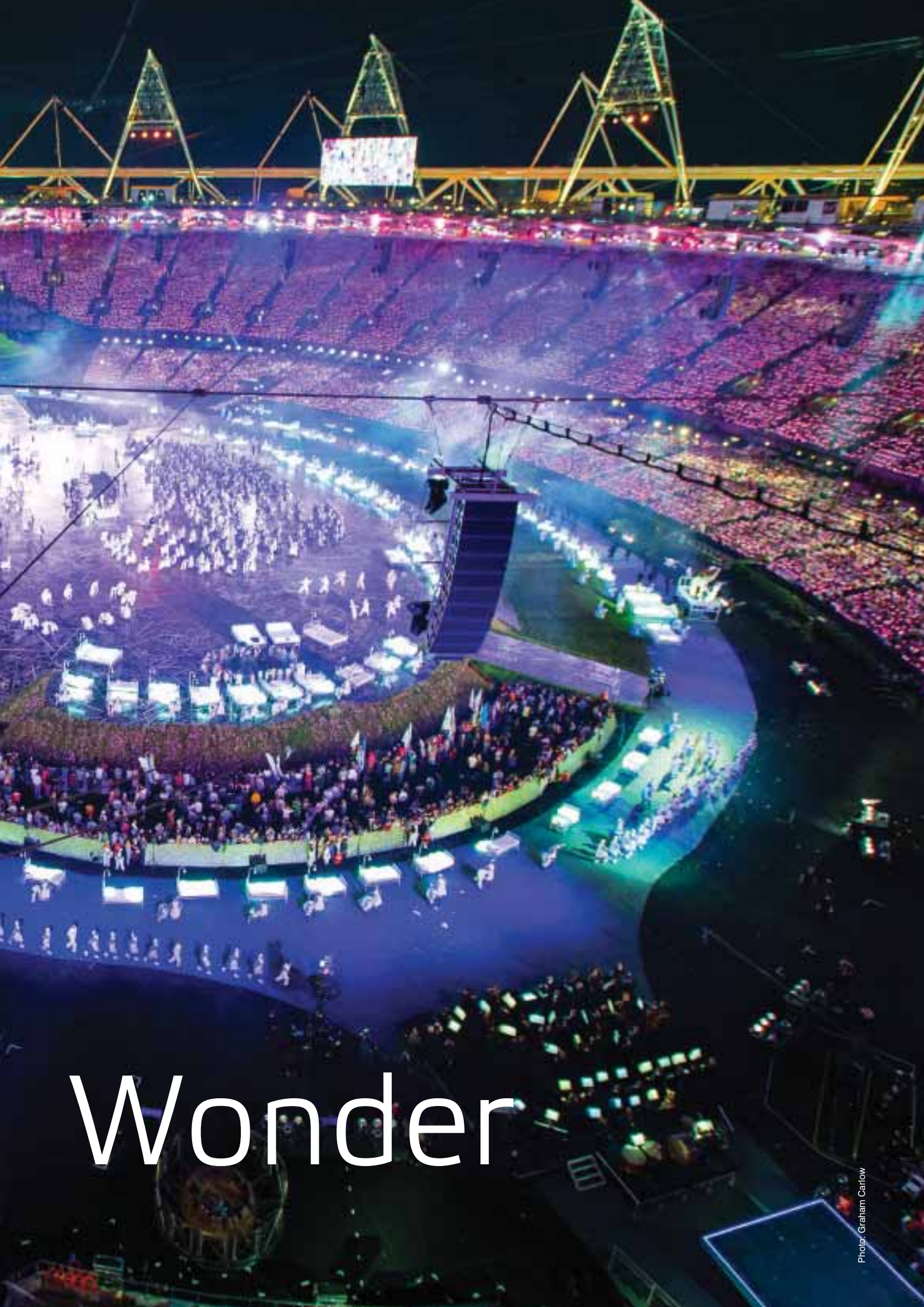

Photo: Graham Carlow

Photo: Steve Moles

One of the beam engines for the Industrial Revolution sequence, provided by Stage One.

We take Heatherwick's drawings and from them create a simple MDF model. In essence, we pre-cut a series of contoured flat pieces, glue them together, and then a final machining to create the MDF petal former. It's like a shoe last that bespoke cobblers use. The tricky bit is working out the shape of the cut sheet of Copper required to be beaten into the shape for each petal last.

"There is just a one millimetre tolerance to the finished petal thickness. With six panel beaters working, it takes roughly eight hours to beat one petal into shape. Then there's further work to polish them, then fit the collar that locates and locks them to the gas burner at the tip of each stem."

At this point one begins to feel a little overwhelmed by Heatherwick's detail. Tinsley says: "There are three complete sets of petals - over 600 individually beaten panels in all. One set is a trial set that will be used in rehearsals and allow us to fine-tune any design flaws: don't forget all 200 petals have to rise as a mass and intermingle in the vertical, and each single flame has also to mingle to form the mightier whole flame.

"The other two sets are the actual Olympic set and the Paralympics set. Every petal is also engraved with the name of the competing country that will carry the petal into the stadium, and each country will be given their unique petal after the games. That's one of the nicest aspects of the design: even if a country wins no medals at all, they go home with something exquisitely beautiful and unique."

The petals are returned to Stage One for cleaning and polishing before dispatch to each country, as the three-week burn will obviously tarnish the petals.

"Why did we go the route of the panel beaters? Well, we did try what's called spray transfer, almost like spray painting the copper into shape. But it was so obviously a machine-made process that the hand beaten version was the only way to go."

Expensive, certainly, but this hand-wrought process was a universally agreed consensus. Speaking to Piers Shepperd months before the Opening, the ethos was clear. He said: "So much of the ceremony is focussed on the authentic voice of the country's transformation from agrarian settlement through industrialisation to modern technological society. The petals are a powerful symbol of the artisanal skills that founded the industrial revolution. All the principal people in the creative team looked at the two versions and there was no doubt in our minds." A decision that will certainly impact on the recipient nations as they take these beautifully crafted objects home.

But petal detail doesn't end with panel beating. Neil Franklin at Stage One was responsible for the engraving of the national names - a process of Sisyphean devilment. "The first question you have to ask is what country has the longest name. That might lead you to place their name on the largest petal, but the petals have to emerge in fixed order . . . so the petals are affixed to the stems in that order. We have also encountered some late additions to the Paralympics, this is the Games where the Paralympics comes of age, with 174 countries competing. The petals for the Para's also affix in reverse order, from the inner ring outwards."

"Choosing Font type was a huge discussion and eventually we settled on Futura. The font has to be distorted in etching, so when the petal is viewed from front edge on, the scripted words are clear and appear consistent." (Think of the distorted perspective used to apply advertising to sports pitches for television cameras, except with the petals the surface is 3D, not flat like a sports field).

"Mapping each petal has been incredibly time-consuming but it will provide a gorgeous legacy for each nation. In keeping with the hand-made ethos, although the etching is by machine the resultant script is then worn to a Hallmark finish. The nine metre long petal-stems have also been worked, they are Zinc-plated, then dyed black, then lacquered on top. We were fortunate in discovering one firm in Walthamstow, the Premier Plating Works, that could do it. Sadly, as with the panel beaters - a small specialist firm called Contour Autocraft in the East Midlands, which normally makes replacement body panels for vintage Jaguar cars like the XK50 - these are all fading skills. Heatherwick's ideas are unfettered by considerations of budget, to allow the greatest artistic freedom. Nevertheless, the budget is managed, in that he will be presented with options to achieve a certain goal. Thankfully, we have been able to give him most of what he wanted."
www.stageone.co.uk

Unusual Rigging

Steve Porter, project manager for Unusual Rigging gives an overview of the key elements of the company's role . . .

"In total we will rig around 300 hoists, although most of them are removed before the event, and most equipment it dead hung. Things like the trusses for the Syncrolites and LED screens fly and split to pass the PA cable-net, then re-join above; that's all rope access work and it's worse for some than others, as they also have to pass the followspot cabins on the roof: these have a peak that protrudes and requires a second split-and-pass. The LED screens are the most awkward - 19m by 8m structures: we

Cable-net explained

In basic terms, there are three cable-nets:

First is the Radial (Automation) cable-net, by Stage One. This is a dynamic system, with 14 radial cables terminating at a central hub; there are two traversing winch trolleys on each radial.

Second is the Catenary (Automation) cable-net - also by Stage One. Again a dynamic system, it has catenaries running the length of stadium, from north to south, with two traversing winch trolleys on each catenary.

Third is the Tension Ring cable-net - a structural device for the suspension of audio and lighting. A static system, it is a circumferential tension ring suspended on 56 radial cables.

Watsons, the principal construction company, erected the teepee steel frames on the roof from which Stage One's cable-net is rigged.

Photo: Steve Moles

assemble them on platforms, float them, split them, lift above the ring, and reassemble. They are stealth-type screens and have a blackout covering behind which, if the wind gets up, can be drawn open; so they're not a simple structure. Each one weighs about nine tons and requires two teams to rig.

"For the PA and light pods, the lifting frame that Jeremy Lloyd in the Ceremonies technical team has designed is pretty slick. Built by Sheet Fabs, the pods are a lift-and-fix kit that works. The big thing is the roof ring they attach to. Rasti Bartek from Buro Happold has done all the calculations for the roof - the three cable-nets, the other loads up on top of the roof, all of it.

"Personally, I find the main catenary for the PA staggering. The cable is 65mm thick, the spokes to the roof are 25mm, all wound and then installed by a cable car company [Pfeifer]. It ends up with 22 pods of 2.5 tons each: the tension on the spoke cables, without load, is between 6 to 8 tons." Why the difference? "Because the stadium is an ellipse, the self-weight of the cable ring causes a deflection across the long to short sides of the ellipse; it might surprise you to learn that when all the PA and lighting is hung and deaded off to the main cable, some pods we calculated will be 1.1 metres higher than others. Overall, the roof proper will deflect between 400 and 600mm."

Photo: Steve Moles

Around 300 hoists were employed by Unusual Rigging.

In case you're interested, the catenaries of the Stage One system that span the full width of the stadium have a 26 ton pull merely to support their self-weight. Is it necessary to load up on opposing sides to even the load? "No, we're told we can load up any way we want - it doesn't need to be symmetrical. The only pain is getting the PA trimmed properly, but we have turn-buckles on the frames, so even when dead hung there is still some adjustment - maybe two inches." Over a 50m throw that should be more than enough if the PA is already in the fundamentally correct position. "The cable deflections under total load have been pre-determined by Rasti. You know I do a lot of work for Unusual with Imagination, so I've done some pretty big stuff in my time - but this is a different scale: just amazing."

Asked about the project and the issues involved, Unusual's Alan Jacobi said: "We are honoured and very pleased to be doing this, and grateful we've had the opportunity to work on such a great event for the country. With regard to sustainability, that comes down to the individual in the end; anyone of any intelligence knows they have to be more sensible in what they eat, wear or drive. Unusual took that on board long before the Olympics. We already have a well-embedded zero-waste-to-landfill policy: we recycle everything we can - oil, paper, batteries.

"At a more logistical level, for this event we consolidate transport trips to minimise impact - a little tricky to manage with the Olympics, as the truck you booked through security can turn out to be too small, as the requirements remain quite fluid right up to the last minute - but we're probably better at it than most, because we do it all the time. Overall, when it came to the tendering process where we had to consider areas such as diversity, race and sustainability, it *has* made us re-examine those things. In that respect, we've become even more critical of what we do and how we think about ourselves as a company. We are stricter with ourselves."

"It has seen us make a massive investment at a time when perhaps we shouldn't - in simple

Photos: Steve Moles

Jean Francois (left) and Paul Charlebois of Show Canada.

terms, probably in excess of 500 hoists, equivalent amounts of truss, and steels. When we tendered for all this and just how much Olympic-specific work we would take on, we were adamant that it make no impact on our day-to-day business. What has been unexpected is that our day-to-day business has seen a dramatic and unpredicted upturn that, perversely, is in no way connected to the so-called 'Olympic effect' - just one of those peculiar coincidences."

I asked Jacobi if being given insight to the full production helps? "Because our work is so critical to any production we are accustomed to seeing the big picture from the start. As others have said, sometimes when just parts are viewed in isolation you wonder if there is any point to it, or where's the message? It's simple - it's The Olympics - and so, from the outset, we know the outline script, and the fact that it's written with a cohesive and coherent narrative is good for everyone because it's very motivational: everyone knows and understands the purpose."
www.unusual.co.uk

Show Canada on the Big Stage

Provider of the massive staging that concealed the complex machinery of the opening, Show Canada designed a decking system for precisely this type of event. I spoke to their project manager, Paul Charlebois.

"The Show Canada stage is founded upon a super unit decking system, roughly 40ft by 8ft," - in reality it's 39' by 7'6", but allow the joins and you have the measure of it. "What makes it challenging is that we have a two-week build to get it into the stadium, then the whole lot has to come out in 48 hours, in time for the first athletics event. We've put in around 90,000 square feet - that's most of the field of play, about 300 panels plus ramps and other custom pieces.

"The crane method for erection has been worked out in conjunction with Ceremonies (L2012C). The steel sections we've fabricated would, in North America, travel on flat-bed trailers and we could off-load and build a stage using a forklift: for this, we've shipped them across in open-top sea containers, so there's no other way to get the parts out except by crane, even if we wanted. Once you've lifted the part with a crane you might as well keep it on the hook to put it in place.

"The ramps are pretty customised and the main decks vary in that the stage is actually rolling hills, so stage height is across four main levels. That variance is all taken care of in the adjustable support legs we designed; the slopes conform to two degrees."

The legs are comparable to Acrow props, as used in the building industry. "They are placed every 10 feet along the ledgers and we were able to produce just two sizes of leg to provide all the support height variations the stage needed. The stage super-deck was designed for the show; we'd never produced anything on this scale before, although we'd done something similar for the Vancouver Winter Olympics a few years back."