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Eurovision!

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EUROVISION

SONG CONTEST MALMÖ 2013

In the capable hands of the Swedes, this year's *Eurovision* production was downscaled to achieve a more intimate show, and also took the bold move of banning pixels from the stage - relying instead on a new star in the projection firmament. The result for the world's biggest music broadcast was an outstanding success. [Steve Moles](#) discovers how it was done . . .



Photo: Ralph Larrmann



Having now attended four Eurovision Song Contest (ESC) finals over the last 10 years I can state unequivocally that this was the best yet. To some, that won't sound much: it is the tragedy of ESC that for all its high production values and, dare I say it, excellent pop songs (in recent years at least), it is badly undersold. You may scoff, but the truth is many, if not all, nations engage the services of professional song-writers, and the performers are stars in their own right, even if they don't feature in the constellations of other nations. Even the UK's Bonnie Tyler, who hasn't had a hit in her own country for over 20 years, has a lucrative career on the continent: I sat bemused in Copenhagen airport on my way home and watched German fans embrace and congratulate her for her outstanding performance . . .

My point is this, and I have alluded to it before: if you actually attend the event and watch the semi-finals and various rehearsals, you get to see and hear most performers at least half a dozen times, and I have to admit there were many songs in this show that I came to really enjoy. Romania's entry is a good example: Ming the Merciless singing operatic pop in falsetto. Listen again and you will note that this song's middle eight contained a classic piece of dubstep breakdown - a device employed by several other nations' entries, I might add. There were many others well worthy of a second listen: measured on cheers in the arena alone, Germany and the UK should have been in the top three, with several others that got nowhere near that position close behind.

ESC, for all its camp glory, is essentially the apogee of the *Pop-X-Idol-Factor* genre, and we know how popular that is. Were the European Broadcasting Union (EBU) a little shrewder, they might insist that national radio broadcasters across the competing nations give equal room to all entrants' songs in the weeks leading up to the contest - then we'd all get to give them a fair hearing and recognise them for the talent and craft invested. That, more than anything, should help address the skewed voting that blights the

competition's finale and leaves many fans departing with a slightly bitter after-taste.

There is something else worthy of note: the Swedes have, at a stroke, rescued the competition from death by bloat. Yet there was nothing lacking in the production values within the arena, or on the TV screens at home. How did they do that?

Production

Compared to ESC venues of recent years, the Malmö Arena is quite modestly proportioned. Downscaling to a smaller venue was a deliberate ploy on the part of Sweden's national broadcaster SVT; it also chimed with the earnest wishes of technical director Ola Melzig and several members of the assembled creative team.

"A return to the intimacy of shows from the ESC's earlier days was what was wanted," offered Melzig by way of introduction. "This is my eleventh ESC, and over those years I've seen the show grow to the stage where we've produced in covered football stadiums. We were offered the 65,000 capacity Stockholm Friends Arena [actually a football stadium], but chose the more modest 12,000 capacity Malmö Arena." The arena holds 13,700 for its intended use, ice hockey.

"The thing is," Melzig continues, "when you go big you lose control, you have to go over the top with the equipment you need, and then to pay for it all you need to fill the venue for nine shows." ESC typically sells tickets to the dress rehearsals and semi finals. "The audience for those shows tends to draw on the local population, but the host nation is automatically into the final, so doesn't feature in the semis, which is a disincentive for local audiences straight away. So, just on that rationale alone, the smaller venue makes sense."

"Malmö still gives us all the facilities we need, even trim height, so there's no compromise in that sense." That said, it's all too apparent the arena is stuffed to the gills with equipment.

People, from top:
 Lighting designers Fredrik Jönsson (competition) and Emma Landare (interval acts).
 L-R: Senior graphic designer Peppe Tannemyr and video content designer Mikki Kunttu.
 Head of sound Dallas Dahl.
 Assistant head of sound Oskar Johansson.

"That's another good thing about being here, in a small venue you can go mental with gear and still afford it, and the impact is massive. There is more gear per square metre than we had in Helsinki in 2007, which was a much bigger venue. We also hung 90 tonnes in Helsinki, here we hang almost 160 tonnes, and considering there are no giant LED screens, that's an even bigger achievement. Yet the technical budget for Malmö is less than we spent in Helsinki."

These are compelling arguments, and the absence of LED quickly emerges as the defining influence. "We always think about the TV audience first, and one of the first things SVT said was that they wanted to get rid of the 'pixelated LED' look. By opting for video projection instead of LED, we have restored the visual depth of the stage; there is no flat wall of LED confining it. That is also cost-efficient: less rigged weight, significantly less power, and fewer RF problems. And with projection, you can paint with a much finer brush. Of course, the LED monster of past years is something I helped create, but I still prefer projection, and now is the perfect time with the arrival of Barco's 40K HDQ projectors, so the projection can compete easily with the light level from the rig: even two years ago what was available just wasn't powerful enough."

Lighting comes from Starlight (Sweden) and PRG; audio from Starlight and AVAB CAC (Norway); all OB facilities and the main video infrastructure come from Mediatec. Other suppliers are mentioned within the text.

Stage Set

The set design, by Viktor Brattström and Frida Arvidsson, is a clever assemblage that gives the camera plenty to look at, but is not so busy as to be confining. It falls into five major elements.

The stage itself is effectively a circle with a teardrop B stage leading off from stage right. Decked in high-gloss black and peppered with stage lifts, both Main and B stages were subtly sculpted in the horizontal plane by steps, like circling eddies upon the water. As fine a platform as any performer could wish for - it gave favour to everyone.

Left and right framing is defined by two massive free-standing crystalline stalagmites, slightly arched, and 14 metres tall. Above centre stage, a dozen internally-lit stalactite crystals flew in to complete the curve.

The crystalline relief is then reflected in a 3D back wall that extends some 45m wide and 8m high. Both wall and arches are, to a greater or lesser degree, used for video projection. This presents the signature visual impact of the show.

Out in the house a 36m bridge lowers from the roof to link the back of the venue with the B stage. It's a symbolic nod to the mighty 8km Öresund bridge that links Malmö to Copenhagen, Sweden to Denmark, Scandinavia to Europe. Any architect will tell you how potent a symbol a bridge can be, and this one certainly achieved a spectacular show opening: all 26

finalists, accompanied by national flag-bearers, process through the audience to the stage upon it. It was an expensive gag (ten tonnes of aluminium moving above the heads of the audience doesn't come cheap) and its sheer size, weight and position presented all sorts of problems for every department, blocking sound, light and camera angles, and giving rigging quite a few headaches - but boy, did it have impact.

The fifth element sounds inconsequential but proved a delightful touch that worked well for camera and live audience alike - the flying LED sculptures. If you watched the show you will have seen the geodesic shapes float in and out of shot many times. All suspended from variable-speed wire winches, it was the grace of their movement that gave them life and made them, like dancing fireflies, an intrusion that delighted and entranced.

Set Design

The design duo of Brattström and Arvidsson complement each other well: while Arvidsson is open and expansive with a ready smile, Brattström is serious, quieter, younger. Typically she will grasp the question and Brattström will bring his contribution at the end. I formed the impression this is exactly how they work together: they never contradicted each other and seemed to have a democratic sense of collective responsibility to the job in hand.

"When we came to the project we first looked at what had been done before," offered Arvidsson.

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Equipment List

AUDIO

Arena PA - Delay

- 42 x Nexo GEO-T 4805
- 4 x Nexo GEO-T 2815
- 2 x Nexo GEO-T Flyframes & accessories
- 2 x Nexo GEO-T ampracks with Camco amps
- 2 x Nexo NX242 controller

Arena PA - Front-fill (flown)

- 14 x Nexo GEO-T 4805
- 2 x Nexo GEO-T flyframes & accessories
- 2 x Nexo GEO-T ampracks with Camco amps

Arena PA - Subs

- 12 x Nexo CD18 Sub
- 2 x CD18 fly system
- 2 x CD18 ampracks, with Camco amps
- 1 x Nexo NX242 controller
- 2 x Nexo S2 Sub
- 2 x Nexo 241 controller

Arena PA - Out-fill

- 42 x Nexo GEO-T 4805
- 8 x Nexo GEO-T 28152 x Nexo GEO-T Flyframes & accessories
- 4 x Nexo GEO-T ampracks with Camco amps
- 2 x Nexo NX242 controller

Arena PA - Front-fill (ground)

- 4 x Nexo PS10
- 2 x Nexo PS10 amplifier

Arena PA - Drive

- 3 x Lab.gruppen LM44 + digital AES/EBU snake
- 7 x Lab.gruppen LM26 + digital AES/EBU snake

Arena PA - Backfill

- 32 x L-Acoustics dV-DOSC
- 1 x Lab.gruppen LM26

Monitors

- 2 x Midas XL8 96+16/48/LCR
- 8 x Midas DL431 input splitter
- 6 x Midas DL451 I/O box
- 2 x Klark Teknik DN9331 Helix Rapide
- 4 x Klark Teknik DN9650 Audio Network Bridge

Front-of-House

- 2 x Midas PRO9 80+8/32/LCR
- 4 x Klark Teknik DN9650 Audio Network Bridge
- 2 x Midas DL451 I/O
- 2 x Waves plugin
- 2 x RME Madi bridge

Green Room

- 1 x Yamaha PM5D
- 30 x L-Acoustics KIVA
- 8 x L-Acoustics SB218 sub

LIGHTING

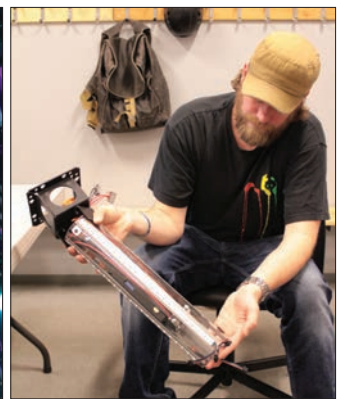
Main Rig - Arena

- 49 x Clay Paky A.leda K5
- 58 x Clay Paky A.leda K10
- 50 x Clay Paky Alpha Beam 1500
- 50 x Clay Paky Alpha Profile 1500
- 129 x Clay Paky Alpha Spot HPE
- 24 x Clay Paky Alpha Spot QWO 800
- 200 x Clay Paky Sharpy
- 75 x Clay Paky Sharpy Wash
- 50 x Clay Paky Glow Up Strip 100
- 40 x Martin Atomic Strobes w/scrollers
- 4 x Hungaroflash T-light strobes
- 55 x SGM X-5 LED strobes
- 82 x SGM Sixpacks

continues on p40>



Photos: PLASA Media



Left: One of the Nexo GEO-T hangs that formed the PA system, amid Tait's LED 'Geodes'.

Right: Tait's Matt Hales shows one of the spare LED modules for the Geodes.

"With that stated desire to return to the intimacy of the earlier shows, one of the first decisions we made was to have a standing audience on the arena floor."

Having now witnessed four of the modern-era ESCs, I can vouch that this is the way to go: a more vibrant, happy audience you could not wish for - all the energy and adrenaline of a football crowd, without the aggression. And they didn't falter for two hours, only sitting down gradually when the tedium of the voting process began. "We wanted it to feel small again," added Brattström, "putting the audience in around the B stage reduced the gap between artist and fan."

And what was the stimulus for the crystalline nature of the set? "When the butterfly motif for this year's show arrived, we started by looking at it; some of the detail came from that. We also took the idea of printing from haute couture and transferred that to a 3D set that could be 'printed' on by the projectors. The positioning of the arches allowed the cameras to move around easily and shoot through the set. Not having LED everywhere took away that strong, fixed look it imposes on a set: with the projection, the 3D fascia gave far more opportunity for expression of light and image through, on, and around it."

And the illuminated geodes out in the arena? "They were conceived as a way to make the audience part of the show. We imagined they would have that effect and it worked." Possibly better than they expected, thanks to the liberating effect of LD Fredrik Jönsson being able to control everything about them directly from the lighting desk. "It made them feel part of the same sky," noted Brattström - as tight and eloquent a summary of their effect as you could wish for.

This show was set by SVT to rein-in the growing, bombastic excesses of recent ESCs. How about getting the budget you needed? "Yes, it has been a struggle, meeting the design deadlines so Tait could build it all was also difficult, but once they set the limit they left us alone, which helped."

I asked what they could have made better had they been gifted unlimited budget, and there was no hesitation from either of them: "We would like to have been able to reassemble the crystalline facets into different configurations,

like one of those Transformer toys." Now there's a challenge for Tait invention . . . it would be costly, but I'm sure they could do it, and what an amazing contrivance that would be.

Set Construction

All of the above was custom fabricated or supplied from stock by Tait (mostly from their Belgium facility); the main stage and B-stage composed of Tait's modular rolling stage rental system. We may already take this system for granted in concert touring, but several times I heard technical crew, TV technicians even, comment on its speed and utility, the magnetic soft connection of the decks that align and secure them before being locked mechanically in place being singled out by several people.

Matt Hales - on lengthy secondment to Belgium from Tait's main shop in Lititz, Pennsylvania - project managed the ESC contract and described some of the thornier challenges of realising Brattström and Arvidsson's dream. "The winched geode sculptures came direct from our US shop. We had already been working on something smaller for loads of around 1 or 2lb [$<1\text{kg}$] using micro-winch, when Arvidsson's request came in. The sculptures weigh in at 30lb [13kg] and so required an up-scaling design; but we had just seven weeks to deliver. They wanted 66 in total, plus spares, so gearing up for mass production was problematic in the time allotted.

"Each sculpture has an RGB LED strip inside; the winch has integrated cabling for data and power within the wire. The shapes are formed from 2mm polycarbonate sheet, four pieces each, folded on four axes to produce the geode shape you see. To reduce weight further there is no structural frame, just a spider-like rigging suspension at the top, so the folding was a contrivance that saw all four pieces physically attached to the spider along at least one edge. Inside is a 3" (76mm) diameter clear plastic tube containing the electronics and LEDs, plus a cooling fan."

And, of course, they are DMX-controlled. Hales explains: "Unfortunately for us, the sculptures' dispersion across the venue was so great that when we linked more than six together the voltage drop became too much and control was lost, so we ended up having to insert a wireless DMX module [from Wireless Solution in Sweden] into each one."

The sculptures' light and movement (up, down and speed) are controlled directly from the lighting desk - the motion via Tait's own Navigator motion control system, the colour mixing and intensity direct to the LEDs. Removing the motion control operator from the cueing equation (without any loss of safety because of the interface with Navigator) made these sculptures an accessible and easy toy for LD Jönsson to exploit: this single facility more than any other meant Arvidsson's concept became much more than a one-off gag, and instead took on a life of its own.

The Bridge & The Arches

"The bridge was relatively easy," Hales continued. "Just straight engineering. It's a framework of Prolyte S50 truss with Tait magnetic decks and our drop-in handrail on top, with some custom scenic dressing panels on the sides. We also made custom brackets to fit Sharpys along the edges. Like any bridge, it's the load that's the worry: with more than 25 people on at any one time it gets sketchy. So like the military breaking step when marching across a bridge, we have to control the flow of people walking across . . . they are walking to music and tend to step to the rhythm."

The stage end of the bridge lands on a triple Tait scissor-lift that rises from the B stage to meet it. The bridge's foremost pairs of legs, which sit on and close to the stage, were able to be fixed to the structure; those further back had to be detached as they would have caused an obstruction when the bridge was up in the roof: folding legs were considered, but in the end it was simpler to have the remaining six legs positioned on the floor by the crew, ready for the descending structure to slot onto. Tait designed conical locator sockets for the bridge's underside to ensure a tight fit.

Tait also provide the 'Flagapault' super-fast personnel lift (also known as 'the toaster') in the main stage. These devices, which at full speed can literally pop-up a performer onto the stage in the blink of an eye, are, like the deck system, stock items than can be rented.

The meat of Tait's work is in the free-standing arches and the crystalline back wall, which Hales calls, "the biggest hurdle." He explains: "Again it was about timing. We saw the initial drawings from Arvidsson and Brattström, and though the design was still in evolution it was enough for us to plan a fabrication schedule and begin addressing some of the problems inherent in the design - not least how do you attach a bunch of irregularly-sized triangular panels to form a three-dimensional, faceted structure onto a free-standing framework? We presented our schedule to Frida and Viktor and they managed to sign off on a final design pretty close to our deadline."

Hales continues: "The arches are steel-framed. Like a giant art project, the thing is when you get into the detailed drawings it all takes longer than you expect. To give you some idea, the individual panels need some way to fit together to form the coherent crystalline outline. The panels are Alu-bond, a 2mm thick aluminium-plastic-aluminium sandwich which has an inherent rigidity, but not sufficient for our



Photos: PLASA Media

Clockwise from top left: Rigging supervisor Sören Durango and assistant supervisor Ulf Brynte; Technical director Ola Melzig and his better half, Joan Lyman-Melzig; Set designers Viktor Brattström and Frida Arvidsson; Barco's Lotta Schiefer with one of the game-changing HDQ-2K40 projectors; Jonas Naesby of Sennheiser, who was responsible for radio frequency management; Markku Aalto of Pyroman, who led the pyro and special effects team.



Norwegian Idol, Oslo Spektrum

STM Show Files



"STM really is an excellent system and went up in the air so quickly. We got a really good result, the front of house engineer was happy and we got really good feedback about the system from everyone involved. After just one concert, I can see that NEXO's claims of STM's flexibility and scalability are well founded. It features the sound characteristics which I've come to love and appreciate with NEXO, and this will make it easy to use with our existing inventory."

Sondre Sandhaug, FOH Technician

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Sound Contractor	Frontlife
FOH Technician	Sondre Sandhaug
FOH System	2 Hangs of 12 x STM M46 Main + 12 x B112 Bass Modules
	3 Hangs of 3 x CD18 Subs + 8 under stage
	2 Hangs of 16 x GEO T as outfills, 2 Hangs of 11 x GEO T as L/R system
	8 x PS15R2 as front fills
Amplification	NUAR amplification racks

STM Scale Through Modularity

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NEXO

- 17 x A&O 3kW Falcon Flowers
- 7 x A&O 7kW Falcon Flowers
- 140 x Leaderlight LL Stage 6-06D W
- 32 x Solaris LED Flare
- 74 x Vari-Lite VL3500 Wash, with stipple lens
- 8 x 2.5kW Robert Juliat Aramis followspot
- 6 x BadBoy CMY (used as back followspots)

Green Room

- 16 x Alpha Spot QWO 800
- 4 x 1kW ARRI Studio fresnels
- 84 x 2kW ARRI Studio fresnels
- 32 x ETC Source Four 15/30 Zoom
- 24 x ETC Source Four 25/30 Zoom
- 20 x ETC Source Four 750 26deg.

FOH Lighting Control

- 8 x GMA2 Light (four active, four spares)

FOH Video Control

- 3 x GMA2 Light (two active, one spare)

FOH System tech

- 4 x MA on PC Command wings
- 16 x NPU units
- 9 x NSP units
- 58 x DMX Universes

VIDEO PLAYBACK & PROJECTION

- 6 x Green Hippo Hippotizer v3 HD Genlock
- 6 x as above (backup)
- 4 x Green Hippo GrassHopper
- 4 x Green Hippo GrassHopper (backup)
- 1 x Green Hippo ÜberPan Master
- 1 x Green Hippo ÜberPan Master (backup)
- 12 x Barco Encore video processor
- 2 x Barco Encore LC controller
- 1 x Barco Encore SC controller
- 28 x Active Barco HDQ2K40 DLP projectors
- 28 x 1:0 Lens HDQ2K40
- 1 x Barco HDQ2K40 DLP projector (backup)
- 12 x Barco SLM 12 projector
- 4 x Barco HD 20 projector
- 12 x Barco HD 20 projector
- 2 x Barco HDF-W26 projector
- 2 x FLM22+ projector
- 2 x XLM HD30 projector

PYRO & EFFECTS

- >1000 Waterfall effects (Ultratec)
- >1200 Stage Gerbs (Le Maitre)
- >1000 Stage Mines (Le Maitre/RES)
- >600 Stage Comets (Le Maitre/RES)
- >200 Falling Stars (Ultratec)
- >200 Airbursts (Le Maitre)
- >300 litres of Flamaniac fluid (Magic FX)
- >200 Spraymaster Cans (TBF Pyrotec)
- >120 bottles of CO2 (approx. 3000kg) (AGA)
- >100kg of fake snow (Magic FX)
- >150kg of confetti (Magic FX)
- 4 x FireCTRL firing desk
- 70 x FireCTRL field modules
- 1 x MA Lightcommander 24/6
- 1 x MA Lightcommander 12/2
- 6 x Le Maitre G-300 + Freeze Fog Pro (heavy fog)
- 4 x Le Maitre G-300 for smoke
- 6 x Ultratec Floor Pockets (heavy fog)
- 4 x Universal Effects wind machine
- 4 x Jem AF-2 wind machines
- 10 x Magic FX Co2 jet
- 16 x Macic FX Flamaniacs
- 16 x TBF Spraymasters
- 3 x TBF 5-Masters
- 34 x Magic FX swirl fans
- 4 x Magic FX confetti cannon
- 8 x Sigma Services confetti cannon



Photo: Ralph Larmann

purpose here, so we reinforce them by laminating to another sandwich of thin fibreglass with polystyrene between, approximately 30mm thick. This gives the basic scenic panel. On the back side of the sandwich we attach an aluminium disk with an M8 bolt glued to it: this will locate into an M10 receiver tube welded to the steel frame - the slack between M8 bolt and M10 tube giving us about 3mm of movement between the panels to adjust and butt them tightly. This all looks great in 3D CAD, but we had plates/receivers at 65 different angles, and when it comes to assembly you realise - oh yeah, we have to fit and partially tighten this panel first, before we can fit that one, or else there simply isn't enough space to get the nut on the bolt of one of the fittings on the first panel. The arches are 14 metres tall, so we rented an expo space in Ghent [Belgium] to work this out before we arrived on site in Malmö."

"For the scenic back wall, the panels are the same sandwich construction, but the attachment was of a different dimension. This uses a full support structural frame made from rental truss, but the realised scenic wall is curved across backstage; some facet peaks extend a metre forward from the truss frame. So we drew up the frame, overlaid the scenic design and could calculate from that the chunks of fascia we would need to grab to support to the frame. Like the arches, we found we'd need 65 different lengths of attachment device, each with variable angles, but there are no steel frames running along the edges of each facet like on the arches, so the fixing required similar flexibility to adjust between panels, but greater rigidity to fix in place, especially as two upper sections of the wall were to be flown. We needed to create fixing points in free space.

"Again, we glue a metal plate to the back of each sandwich panel with a cone cup. We put the cone onto the end of a machined arm that extends from where it attaches to the truss frame. These arms are themselves adjustable, the arm extending or shortening through a lockable slider. We calculated four slider sizes to cover the range of 65 different lengths required. The cone on the end of the arm is mounted to universal joint, and the cone has

a machined groove close to its base that accepts a locking pin from the cup on the panel. Once the panel is offered up to the arms, and cup pins engaged and locked, the panel is totally secure. While the back wall will be scrapped and recycled after the show, the wall arm mountings are now a toolkit solution to attaching any kind of 3D shaped scenic panel to a free standing ground support wall of truss. It will adjust to pretty much any geometry."

It sounds relatively easy, but again, think of the span of the wall and the size of each facet, and imagine assembling this using cherrypickers. "Yep, it did take some time," said Hales. But it does the job.

Rigging

Step into Malmö Arena and the first thing you notice is the ceiling awash with gear. Lead rigger Sören Durango is, like all the Swedes engaged on this production, fluent in English. In fact, he speaks more fluently than many English riggers I know, but that's the benefit of learning a second language.

"I was actually co-opted into the production design team back in October, so not only responsible for the rigging, but to provide an overview of the project as it developed. Are things too heavy, too difficult and thus too expensive to solve? The typical scenario is to take the first lighting and set drawings, overlay them to the building and see where they clash. That stage went well. Although they weren't always in agreement, it was easy enough for me to resolve the problems that emerged between the two: I defined the shape of what's possible. From there, I went to develop the complete detailed plan of the rigging.

"Once you have the plan - how much gear? how much weight? how much space does it need? - then it's just logistics: how many people do I need and when? At the peak we had 20 riggers, including ground workers, between six and eight climbers the first week, rising to 15 for the next couple of weeks, dropping back to a steady four or so thereafter."

Every part of the roof is accessible from a catwalk and safety-wires are integral



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Projection: Breaking the rules

Barco's new HDQ-2K40 projector was one of the stars of the show at Malmö. Lotta Schiefer, business development manager at

Barco, relates the story behind its appearance: "We had been talking to Ola Melzig about the show during last year, but by September, when Ola visited the PLASA Show with lighting designer Fredrik Jönsson, the decision had been made by the set designers, and they told us 'We don't want to see a single pixel.'"

As it happened, Barco had been developing a 40,000 lumen projector, and had a model available for previews at PLASA. Schiefer says: "We showed them the HDQ-2K40 and asked if they could do it with that. They said yes, they could, and it became clear that this was the way to go."

Then came the very geometric, three-dimensional design of the scenic backdrop, and the projection challenge deepened further. "This broke every rule of projection," recalls Schiefer. "For good projection you should have a flat surface, avoid ambient light, project as straight-on to the surface as possible and get a good distance away to avoid hotspots. We broke all those rules straight away, and another ten while we were at it!"

Crucially, Barco was able to look after the complex warping adjustments with its powerful Warp software. This enabled the provision of a corrected grid, to which the video team could apply the projected content via the Hippotizer media servers.

The warp correction is so good that at times, the three-dimensional surface can appear almost entirely flat; even the naturally brighter leading edges of the geometric structure are evened out to assist with the illusion. At other times, the projection design takes full advantage of that fractured, three-dimensional landscape and its true nature is revealed to great effect.

The HDQ-2K40 projectors for the backdrop are arrayed in pairs (one running, one spare) just behind and below the main stage, firing up towards the screen at an angle of around 30°. Others are positioned above the stage firing down, for aerial effects on the smoke and on performers' dresses.

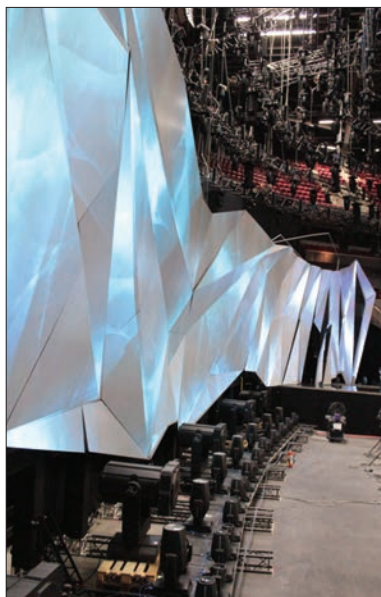
"Mikki Kunttu has said that the HDQ-2K40 changes the rules of projection," said Schiefer. Kunttu himself told LSi: "It's the first time for me where the projected image is so bright that if we do a white-out on the projectors, we don't see the lights on the stage... It's fantastic - it's so bright that it's no more a question of pulling down the levels of the lighting at all."

Lee Baldock

> www.barco.com



Photos: PLASA Media



Clockwise from left: The three-dimensional rear screen, with A&O and Clay Paky fixtures beneath; Close-up of Tait's fixings for the screen panels to the supporting truss structure; the array of Barco HDQ-2K40 projectors at the rear of the stage.

throughout. And there is much more to rig besides the main hall: the green room and press hall both have more than 50 points.

"Lighting was the largest consideration," Durango continues, "followed by camera production: the 'Rail-Cam' down the centre of the room made it necessary to split the lighting rig in half, so the camera could sweep as far upstage as possible. Then there are the set-pieces, the two Tait arches that flank the stage aren't rigged *per se*, but they're steel-framed, tall and heavy, so we put a point above each to provide stability, and used it to raise the top section, build the lower base beneath - which has ballast as well for stability - and then lower in the top.

"Besides lighting and camera stuff there are two bus-stop platforms for the 12 followspots in the house, and a dozen projectors in the air. It's an easy roof - you can only rig off the low steel which has a safety line built in. It's 22.4m to the floor; the high steel is eight metres above that, but the roof sits right on it. With so many points, and so much stuff to hang, we had to eliminate as many brides as possible, using bumper trusses instead to give us the dead-hang positions; some of the bumpers are even just laid onto the low steel."

As a moving object, the biggest element is the flying bridge. "It weighs almost ten tonnes, including motors. The motors add a lot of weight - Movecat's BVG-C1 rated hoists are 135kg each with chain [and each has a further 18kg of control beside it - a total of 153kg per hoist] and there are 22 of them for the walkway. We have another 30 Movecats for the moving light trusses and for raising upper sections of the back wall. These hoists are ideal, TÜV rated for over-audience use, with in-built load-cell and variable speed control. The walkway is very heavy and production only figured in a 40-second cue for it to lower in. We calculated the dead-stop emergency limit in terms of dynamic load arrest (momentum over weight) and determined 18m/min was tolerable for a decelerated stop without damaging the roof - the Movecat will run at up to 24m/min. As it happened, this made the descent to cue position take 41 seconds, which was close enough for the show.

"The rest of the rig is hanging off 0.5-, 1- and 2-tonne Chainmasters, and there are one or two Lodestars in there as well. There is an extra bus-stop platform stage left for the four Stage One winches that handle the personnel flying for the interlude act, using their excellent Q-Motion control. That was a job in itself: the winch position is OK, although we had to motor bridle to pull it up out over the bleacher seating, but to get the people lift pick-ups correctly positioned above stage took a considerable amount of time - diverter pulleys located through and around trusses to get the wire to the right place."

Unlike the fit-up, spread well over a month, the load-out had to be completed in 72 hours, so Durango religiously detailed every point as they went in, so that unpicking the giant web of wire might proceed quickly and safely.

Video

With SVT's desire to eliminate LED and the general consensus of Melzig's creative team to embrace a return to projection, video was always going to be a defining element of the show. Mikki Kunttu, who readers may recall designed both lighting and video back in 2007 for the Helsinki ESC, has this time been persuaded to focus purely on video, while Fredrik Jönsson does the lights. Kunttu is supported by another Helsinki veteran, Johan West, as media server manager: West ran me through the video set-up.

"Video mainly comes from a bank of Barco's 40K HDQ projectors arrayed in an arc across the back of the performance area, covering the rear wall. The outer sections of wall are covered by projectors flown and tucked in behind the two arches that frame the stage, and we also have more flown projectors further down the room; to project onto the stage surface and to cover the two i-mag screens off to the extreme sides. There are a couple of 20ks up there as well, used to project the blocking on stage for the positioning of the contestants' props.

"Much of the basic outline content was generated in advance by Peppe [Peder 'Peppe' Tannemyr], our senior graphic designer and his team. This

was done in Stockholm at SVT, largely by Peppe with Neil Trenell and Mikko Linnavuori. Here we also have two more programmers on site."

I asked West, why so many operators in Malmö when you already have the content largely pre-programmed? He replied: "The content is just a canvas to be developed once the show starts to take shape in the production rehearsal stages, under the guidance of Mikki Kunttu, our overall digital content designer. It was Mikki who gave the outline brief to Peppe and the team."

West continues: "It's being run from 12 Hippotizer v3HD Genlock media servers, and eight Grasshoppers [all Green Hippo], run via GrandMA2. We found with four MA2s out front and even more in the content generation suite buried in the depths of the building, that there was too much traffic to run the system on Art-Net, so we use the MA network. The response time from the MAnet was just better. We have 17 live universes for the Hippos, plus 17 redundant. When we first set up, I rigged and ran all 34 on separate sessions to test, and MAnet was still stable. Now the two sets are run simultaneously." West also revealed that he'd swapped over output from different servers at random instances, "just to see if anyone noticed the change from main to back-up server. No one did."

"Projector shutters are controlled from front-of-house as well as from my end - the theory being that operators are much more likely to see a malfunction from their position than I am, certainly sooner, so the shutter control at the MA2 makes response to such situations as fast as it can be."

All the Barco projectors are brand new - some 28 40HDQs - and are supplied by Mediatec of Sweden, with support from Barco. "They have been running non-stop since we set them up on 18th April - a month, basically - apart from a lamp change for all of them the weekend before the broadcasts began. The projectors cut back to 50% when the shutter is closed, but yes, there's still a fair amount of power consumption for that time, but it keeps them stable. I was concerned about movement from rigging and the heat of course, but they've been fine and kept alignment. The audience may still yet affect them through the inevitable increase in humidity." Another good reason for opening rehearsals to the public.

West continues: "The Hippos are supplied by RGB from Tampere in Finland, which is where I work, with 50% sub-hired from Brown's Blend in Sweden. We have a close and healthy working relationship with Brown's, and both parties like it that way. Raw content is 490GB, custom files number approximately 1,200. That back wall constitutes 5400 by 1080 pixels, so it's a huge amount of rendering required - we spend a lot of time encoding content. The signal passes out from the Hippotizers to the Barco Encore system, from there to the projectors. There are 16 layers running constantly, and the designers are changing stuff all the time through multiple sessions out front. The great thing is, Neil and Mikko fully understand how the system works, what it can and can't do, so I can rely on them to work accordingly and not exceed processing power."

There is a sequence in the second semi-final where BMX riders and stunt dancers 'paint' a large scenic element linked to their movements. West explains: "We use BlackTrax 3D tracking system from Cast, the Wysiwyg people, for that sequence, working with what's called the 'particle generator' in the Hippos."

To explain, the Cast BlackTrax system is for tracking moving people/objects on stage via IR transmitters. It's a sophisticated system that enhances its own performance measuring speed and acceleration, while orientation is transmitted by RF to the same controller. It was used to sequence a dazzling visual passage where the stunt skater/dancers and BMX stunt riders 'paint' the set with video colours like paint onto a canvas as they run through their paces. "We wanted the sequence to look natural," said West. "You can't have just an ordinary video file activated to do that, you need something floating and responsive. Nigel Sadler at Green Hippo created the particle generator as the tool to achieve this: it took a fair bit of trial and testing, but he pulled it off and it worked great in the end."

It's a beautifully realised sequence and looks so easy, but as is so often the case, that hides the underlying complexity. Green Hippo are as yet unable to say if/when the particle generator will become a stock component in the Hippos.



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Roll-call

Production

Creative director - Sven Stojanovic
 Technical director (show) - Ola Melzig
 Assistant technical director - Tobias Åberg
 Technical Production Assistant - Iveta Procklova
 Operations Manager - Axel Ekblad
 Technical Supplier Manager - Joan Lyman
 Logistics Manager - Bertil Göransson
 Production manager - Tomas Olsson
 Production Assistant - Michael Karlsson
 Viewing Room Producer - Stuart Barlow

Audio

Head of Sound - Dallas Dahl
 Assistant Head of Sound - Oskar Johansson
 FOH Sound - Matthias Winter, Mattias Gustavsson
 PA System Engineer - Magnus Johansson
 Monitor Engineer - Johan Rinstad
 Monitor Liaison - Martin Bränge
 Backing Tracks - Peter 'Degen' Degerfeldt
 In-Ears - Abbe Alhbin, Oskar Meijer, Maria Andrén,
 Anders Ekstedt, Jessica Brown
 Microphones - Frans Ebbeson, Mattias Poussette,
 Fanny Ljungblom, Jens Brugge, Cecilia Fagerström
 Green Room Sound - Kenneth Back
 Green Room FOH - Daniel Rüdén
 Sennheiser Rep - Jonas Naesby
 AVAB CAC Rep - Øystein Karlsen
 FOH Assistant - Erik Grahn
 Comms Project Manager (Riedel) - Benedikt Leister

Lighting

Lighting Designer (competition) - Fredrik Jönsson
 Lighting Designer (host & intervals) - Emma Landare
 Gaffer - Peter 'Angry' Andersson
 Viewing Room Lighting Assistant - Helen Marenghi
 Light Operators - Danne Persson, Calle Brattberg,
 Timo Kauristo, Pontus 'Bullen' Lagerbielke
 Followspot Caller - Anders 'Q-lan' Wallertz
 Project Manager, Starlite - Fredrik Moritz
 Project Manager, PRG - Matthias Rau
 Followspot Supervisor (Stageflight) - Mikael Jakobssen
 Followspot Operators - Katja Aihla, Cina Forsgren, Lina Hansson,
 Fredrik Hill, Victor Svensson, Marcus Brandberg, Robert Holm,
 Mika Pulkinen, David Webeklint, Johan Ilve, Conny Jarneståhl,
 Rasmus Webeklint, Kevin Moorhouse, Jeff Fridén

Video & Projection

Video Content Designer - Mikki Kunttu
 Senior Graphic Designer - Peder 'Peppe' Tannemyr
 Graphic Designers - Lennart 'Korven' Wählin, Johannes Ferm Winkler
 Video Operators - Mikko Linnavuori, Neil Trenell
 Media Server Managers - Nicke Liljeqvist,
 Johan West, Morgan Brown
 Green Hippo Rep - Nigel Sadler
 Projection Technicians - Nicolai Gubi Schmidt, Marcus Krömer
 Senior Project Manager (Mediated) - Niclas Ljung
 Project Manager (Mediatec) - Lars Mossberg
 Project Manager (Barco) - Abbe Westerlundh

Pyrotechnics

Pyro Designer/Operator - Markku Aalto (Pyroman)

Set & Stage

Set Design - Frida Arvidsson, Viktor Brattström
 Senior Project Manager (Tait) - Matt Hales
 Asst. Project Manager (Tait) - Brandon Bogaert
 Head Carpenter (Tait) - Jason Spisak

Rigging & Stage Crew

Prod. Coordinator/Head Rigger - Sören Durango
 Assistant Head Rigger - Ulf Brynte
 Stage Crew - Tomas Pihlblad, Sven Sundqvist,
 Henrik Lindstedt, Erik Blomdahl
 Crew Chief (Stageflight) - Erica Kulin



Photo: Ralph Larman

Video Content

Peder 'Peppe' Tannemyr is Senior Graphics designer for the show, another ESC video content veteran, with his long hair, beard and sonorous tones, he personifies just the sort of figure you'd want commanding this lot of creative digi-demons. He says: "This is my eighth ESC, I think. Generating the basis content has some obvious pointers, the songs are basically *schlager*," (a German term for pulp-pop, though not in such a pejorative sense as we might infer in English), "so if it's bombastic we know what to do there; or if a tiny, beautiful little treasure story, then likewise we know where to head with that. The content form comes from us, not the contestant nations; it would just be too difficult to manage through them." Something Mikki Kunttu was to expand on (see below).

Tannemyr continues: "When the contestants first arrive we get a relatively long 35-minute rehearsal with each, where we shake out the pre-programmed video and yes, of course, we tweak to suit their needs. When the music first arrives with us we often don't have a clue what they're singing about, though most sing in English, which is OK. So we gauge emotion from the music and expect to make changes: we generate the content with that thought in mind.

"Time to adjust on-site is relatively short, and as Johan said, it's a very big image to re-render. Personally, I like the Hippos - they certainly make my life much easier. At a technical level, one file is approximately as big as a dual-layer DVD full of data, so it's a lot. That's why sometimes Neil and Mikko are tucked away in a room away from the arena floor, where with some peace and quiet they can concentrate on making the changes. So long as they have remote access to the MA network, that's a better way to work than being down at front-of-house with the distraction of everyone else all working away."

Barco Encore

Abbe Westerlundh, the personification of Barco support, explains: "The Encore

distribution takes care of the cutting and scaling. The Encore system has the Athena scaler, which means we can select down to individual pixels: it's not a percentage-based scaler like you find elsewhere, so that single-pixel accuracy is as precise as it gets. The Barco system is one of the few that can do that. Yes, there are others, but this is achieved with extremely low latency, just a single frame. Two frames are lost elsewhere - one at the projector, for example - but we think three frames total is more than acceptable. Though we see it, most viewers just wouldn't notice."

"Of most impact was feeding signal to the projectors. 'Ho', I said at the first production meeting, 'So you want us to run fibre to 28 projectors?' Fortunately, Ola Melzig could see this was a point of considerable vulnerability. By positioning video world immediately backstage, the majority of the Barco 40HDQs are within 100m, so we can run to them using BNC coaxial over the 3G Barco Link - a much more robust connection - and to the most vulnerable of positions."

"In simple terms, the Barco end of the system deals with geometry and light, the Hippotizers with the precise position of the content on the screen surface."

It should be noted that besides projectors, Mediatec also supply all the infrastructure, network hardware and mains, with RGB plumbing their Green Hippo equipment into it.

Video Director: Mikki Kunttu

If you've ever wondered why there is always a significant Scandinavian contingent at the PLASA Show in London each year, here's one good justification. "I was first approached by Ola [Melzig, Eurovision 2013 technical director] and Fredrik Jönsson at PLASA," began video content designer Mikki Kunttu. "They didn't quite pin me against the wall, but they made the proposal that they wanted me to take responsibility for the video. It was a good offer; for me, to collaborate with another LD is always interesting. One of the first things I said was, 'I don't want to



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use LED because of the impact of all those pixels in the TV image'. I was so surprised and pleased when the producers came back and said they wanted exactly the same thing."

"Initially, I collaborated with Frida and Viktor and the set design. I said 'let's be more aggressive with the back wall' - something more 3D. I was confident we could exploit it well and fully. I didn't want flat, 2D back screens. To deal with video on a show like this you must always approach it only from the creative point of view; you must look at the technical challenges later. The technical guys will either find a way to do it, or another way to do the same thing, or maybe it's just impossible. Then you have to ask the question: how important is it? Usually there is an alternative."

The reliance on projectors is a bold step. "What makes this work is the appearance of the Barco 40HDQs: you see this most acutely from the aerial projectors down onto the stage. Even with all these hundreds of moving lights, the light from the projector is stronger; in white light they put the moving lights to shame. Yes, we are very fortunate to have 28 of them - there are not many shows where we could do that - but they are amazing quality."

Tannemyr mentioned the absence of input from the contestant nations to the content process. "We do get a look and feel from each country, but we don't enter into a correspondence. If you try it, people tend to get very literal with their visual interpretations of the music, 'I see clouds in a bright blue sky, children running through the woods'. These things are too direct: we need images that leave the emotional interpretation to the audience, and simpler forms that can transcend cultural and language differences. So we think in texture and atmosphere, in just the same way you do with lighting."

That's quite a key statement. As more and more LDs make the transition to video, they bring with them a skill in creating emotion and texture from abstract sources. So, not so much *what* you see as *how* you feel it? "Yes, abstract is a better way," says Kunttu.

He continues: "We arrive at production rehearsals with the content 95% formed, almost 500GB of it, and then between the Hippos, the GrandMA2s, and my four operators we start to apply the creative touches that blend the content to the performance. So, when we first create the content it's never with the view that

this will be a simple playback to the song, it's created specifically to be *honed* to the song Peppe knows we will play with the colour, the speed, the contrast or whatever, to apply that creative touch."

There are four MA2s out front for video, two for lights, plus Jönsson has a fader wing; then there are three more on the MA network - one backstage with Johan West, and two upstairs with Trenell and Linnavuori in the video suite. Apart from the network advantage pointed out by West, I asked what other benefits an experienced LD and video director like Kunttu sees in the MA2? He said: "I wish MA would produce a specific control surface just for video - even if it is a Wing to the main desk. That, for me, would be great. But the truth is, there are things you can do with an MA2 and Hippos that you just can't do with other desks, so in that respect it is the only choice. And it is a fantastic console."

Since the initial concept of 'no LED', has the realisation achieved all you hoped for? "The aerial projector programming has made me really happy, and also the power from the projectors giving the ability to project into thin air - those are very potent images on screen. To select an example at random - the Moldovan entry features a dress with a huge train; we project image straight onto that mass of fabric, totally free of pixelation, and it looks absolutely beautiful." Enough said then.

Lighting

LD Fredrik Jönsson's passage to ESC wasn't quite as smooth as Kunttu's. "We did hope to

have the design finalised by late December or early January at the latest, but it just didn't work out. In part that was due to the development of the set design - but that, of course, we had factored in. No, the problem was the *Melodi* competition."

The *Melodifestivalen* is the touring elimination show by which Sweden selects its entrant to the ESC each year. Many of those working on ESC cut their teeth on *Melodi* and it informs some of their decisions.

Jönsson explains: "I would be working Tuesday to Sunday on *Melodi*, then turn my attention to ESC Monday and Tuesday. Because the form of the set determined the design of the lighting rig, I had to wait till a time when I was busier than I expected to be with *Melodi*."

"My main goal was to have more lights in the system that didn't visibly hang from trusses - lights that I could move to different height locations to change the space of the stage. So the whole system was black from the start, and many lights are hung directly from vertical pipes that hang down below the trusses."

The main rig above stage is a set of concentric semi-circular trusses that hug the back and sides of stage and extend way out, almost to the back wall of the venue. "I would have liked the pipes to be five or six metres long, but because so much of the rig is sitting above the seating tribunes, there simply isn't the downward travel available for that length, so the pipes are three metres." But still, the effect is achieved, and from the camera's perspective the appearance of a regiment of Sharpys, without the looming presence of a truss above them, in what was previously clear space, is both startling and delightful.

Jönsson continues: "The rig is nearly all Clay Paky with some Six-Packs and LED strobes from SGM," (see *full list elsewhere*). "I wanted all Clay Paky because they have a very complete inventory of different lights for different jobs. We started with the Sharpys; I'd also seen the prototype of the Sharpy Wash and knew I could use them to good effect. But in the wider context, having Alpha Spots, Profiles and Beams of various wattage allows me to change the environment in ways that are quite visual. For example, the Spot HPEs are very strong for



Photo: Ralph Larmann

effects in the air. From Clay Paky you get a complete package: I'm even using the Aleda K5 and K10 - the K5 inside the arches where I can accent those structures, and K10s around the auditorium, where I'm using them to back-light the audience. It's good to have a coherent set of lamps that by intent are designed from the same mould." It's worth noting that Jönsson positions his audience lights so they shine on the audience from behind: they're not dazzled, and the image is, for the cameras at least, a little different.

Jönsson had an interesting reaction to the switch from LED videowall to projection: "I was scared at first. Normally at the back you have a transparent LED wall and you can position lots of lights behind the screen and have them shine through for a variety of significant, revealed looks. So I was relieved when I found the back wall would split at two levels in the horizontal plane and I could still achieve those surprise lights from behind."

Beyond time management, had the *Melodi* tour affected your approach to ESC? "We have, over the years, developed a way of working using multiple board programmers running separate sessions, so different songs can be worked on at the same time. That process was part of our decision to make the GrandMA2 the desk of choice: the programmers can develop their own

timecode for each song, add new effects, make general editing, and switch in or out of the main frame as suits their workflow. That was instigated long before we even came on site here, so we arrived pretty much fully programmed.

"One thing I have done is delegate one of my team to create a global cue list - a written marker for all the potential cue points within every song. With that list, we all have a common point of reference. So, for example, if I'm thinking of refining a cue at a given point I don't have to struggle to describe it to one of my programmers - 'you know that bit in the song where the balalaika player does that certain thing?' That speeds things up enormously. Also, the fact that the MA2 allows you to present information on screen any way you want to see it means I can have that global cue list always to hand, alongside whatever other data I want to see."

The Tait sculptures are operated as another part of the lighting system: is that a useful feature for you? "We control the LEDs within, and their position, via the Navigator. That has proved really good in the program editing stage: as we try positional ideas with the sculptures, inevitably we end up finding a look we like and then, when we run the rest of the lighting scene to see where we might use that look, we find one or two sculptures are now in the way of a followspot beam or something. To be able to adjust



Light Bites

● Last Eurovision? Ola Melzig is contemplating withdrawing from the annual ESC carnival: "I always said I would stop after 10 shows; this is my 11th - but then Malmö is my home town and 11 is my lucky number, so how could I not? But it could be time. I now live between Malmö and my wife Joan's home in Texas and I would really like to do more work local to those two locations. As you can imagine, after something like ESC or the Commonwealth Games in India, returning to do the odd small corporate event can be a relief. I too worked the *Melodifestivalen* this year, but just as a viewing room manager. That was great fun."

● Leader Lights were part of the effects rig, placed high above stage. A linear multicell strip, they not only cut well, but also produce square beams making for interesting effects on the stage surface.

● PRG Bad Boys were used as on-stage/in-truss followspots, hand-operated.

● There were a large number of strobe units in the rig, from various manufacturers. These included 40 of the ubiquitous Atomic from Martin Professional (complete with scrollers), plus the latest generation of LED strobe fixtures, including 55 of the X-5 LED strobes from SGM and 32 Solaris LED Flare fixtures from Latvian manufacturer, Company NA.

● The really big beam looks were provided by A&O's Falcon Flower fixtures - 17 of the 3kW version, plus seven of the 7kW version.

● The stage is skinned with high-gloss black Formica, "more durable and scratch-resistant than flexible floor material," said Matt Hales from Tait, "but brittle, so again we laminate it to 18mm ply. The important thing to remember is to laminate the underside with a comparable material, otherwise you end up with the potato chip effect under heat and humidity..."

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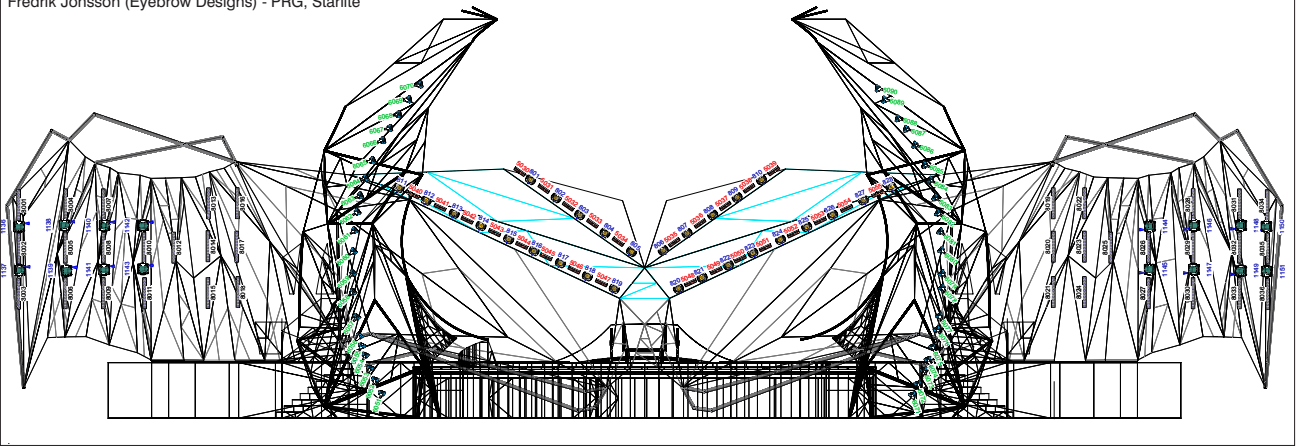
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Fredrik Jönsson (Eyebrow Designs) - PRG, Starlite



Above: Set and lighting design, front view.
Left: Technical director Ola Melzig.



straight from the MA2, rather than call up the motion control guy and say, 'can you tweak sculpture 52 up 20cm?' is so much faster. The icicles above stage and the geode sculptures all come from the set designers; that was a gift to me in that I'm able to change the room dynamically and make the audience feel more part of the show. Having direct access to control

them has made me use them more than I might have with a separate operator."

He continues: "Not all things are so positive, but in a tight environment conflict is inevitable, so you have to find ways to achieve your original idea. We had to split much of the lighting rig right down the middle to facilitate the camera track which extends through the rig to place the camera behind the performers. That didn't change my design, but it had a big impact on how the rig was put together." Does Jönsson take a lot of instruction from the lighting camera director? "Hardly at all: I did 13 years in TV before I came to designing for events, so I have good measure of what is required."

wash lights. I prefer soft edge, and with the Sharp Wash I didn't expect it to have that softness."

Landare continues: "Lighting in the Green Room is straightforward - just providing an atmosphere for the artists to enjoy their time in there, though of course there is a show element: there are interviews to camera here, so they need to be lit with proper consideration. As for Fredrik's choice of board, I've had a look at the MA2 before, but not enough to say anything. However, it has proved a great choice for running multiple sessions for programming. It's important when you have several programmers to be able to allow them to do *what* they want, *when* they want, and it's probably not so constructive to have everyone working on the same song at the same time."

Pyro & Effects



From Finland, Markku Aalto of Pyroman Oy is another Eurovision veteran. For this show he heads a team of six technicians, responsible for setting and firing literally thousands of pyro effects across the various shows. "We have a total of 14 pieces of the Magic FX Flamaniac, which produces the coloured flames at various angles; then we have TBF Spraymasters, which is a spray-can flame unit which makes balls of flame, and TBF 5-Masters, which produce a 5-flame effect. We also have a lot of normal pyro effects - I don't remember how many, but there's a lot!" The equipment list will enlighten you further, but the fact that there are 1200 Le Maitre stage gerbs alone will give you some idea.

As well as all the fog, smoke, wind, snow and confetti effects which were repeated throughout the various rehearsals and performances, Aalto and his team was also responsible for the spectacular storm of gold-yellow confetti which accompanied the winner's encore.

> www.pyroman.fi

Audience & Green Room Lighting

Emma Landare has the task of lighting "everything outside of the actual contestant performances" - which proves to be a fair chunk of work. "I light some of the host opening sequence, the interval acts, the Green Room, and yes, the audience - and being for TV, the audience is a big part of the show. I take some direction from both the camera director and Fredrik [Jönsson]. During the performances they want audience shots as well. Fredrik did the complete design, although he and I have worked together on this and on the *Melodi* shows for a number of years now, so he knows the tools I like to use and so he puts stuff in the rig for me. I like to do a lot of lighting from the side rather than the front, top or back."

It's such a big show to watch that Landare's preference for side light might pass you by, but it's worth reflecting that such a simple difference in style can give the camera director a contrasting look that helps differentiate between the main performances.

"Fredrik has the design in his head, so when I officially came on board on 22 April I had to find where everything is," - no small task under the circumstances. "Some lights I'm still discovering." Landare was being a little disingenuous; this was the day of the final and her command of the system was complete. She continues: "This is the first time I've used the Sharp Wash and I think it's two lights in one. It has a tight beam, it's fast and packs as much punch as a regular Sharp; wide spread, it's still a potent wash light - and I like to use a lot of

Sound

In many ways, sound is the poor cousin of the ESC production: although ESC is all about the songs, it is fundamentally a TV picture show and as such PA is relegated to the upper reaches of the venue roof. "We are the first to come in," confirmed Oskar Johansson, officially assistant head of sound, but very much running the day-to-day organisation of the audio team from Starlight.

"Everything we rig has to be above the lighting system and out of the way of the cameras. We're using Nexo GEO-T. The system installation was designed by Magnus Johansson and is a little unconventional. The stage and B stage extend down the first 30% of the hockey floor, so although we have a main left and right hang at what you might call the 'proscenium arch' position, it's only very small - seven cabinets in the line - and we drop the level from it way back when the host is addressing the audience between contestants. So the main PA work is done by the delays - the really long hangs, are off to the sides into the stands, and mid-way down the room delay position. The hockey-stick line arrays are tightly curved at the bottom, the lowest cabinets pointing vertically down, some even slightly upstage - something I believe is only possible with the Nexo GEO rigging. There is also a back-fill of dV-DOSC high above at the upper seating blocks to the back side of stage."



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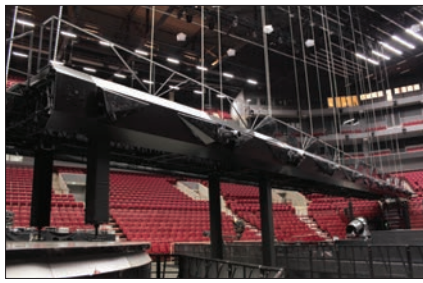
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Clockwise from top left: The bridge, built by Tait, slotted into its position up in the roof - and down in position after its 41-second descent; A Midas XL8 console at the monitor position - and a Midas PRO9 at front-of-house.

This latter is a nice touch: the audience here is small, and with so much of the enormous lighting rig below them, their view of the stage is badly compromised, so the added intelligibility afforded by the dVs is a gesture well made.

Johansson continues: "There are 12 zones in all, run off Lab.gruppen LM44 and LM26 via Dante - dual redundant loop, of course - and we have a third back-up in analogue. On stage

there are three L-Acoustics 1500FM wedges beneath the stage deck, and we have ARCS concealed in the set to left and right, providing some music feed for the various dancers."

It's probably time the EBU acknowledged that these shows have become so complex that performance couldn't continue in any meaningful sense if the singers were obliged to rely upon the wedges in the event of a catastrophic IEM failure: most, in fact wouldn't even be in the right position to hear them anyway, so they are a pointless gesture. We don't, for example, see a second PA system up in the roof 'just in case' . . .

"Desks are also doubled," continued Johansson, "a pair of Midas PRO9 for front-of-house. They output through Lake Processors for system EQ, then to the Dante network ring. And we have two Midas XL8s for monitors. There is a full Pro Tools rig in the OB truck and it's there that any effects are applied: this feeds back to front-of-house and we can use them if we wish. The system is set up so that if front-of-house fails, the OB truck can still feed to the PA system via SMPTE. The desks and extensive Midas network infrastructure is supplied by AVAB-CAC, which is part of the same company that owns Starlight."

Rob Hughes from Midas was on hand to deliver any technical back-up should it be required, but as he himself said, "these guys know this set-up better than any, so my presence is very low key."

At the monitor position the backing music for all performers comes from a Steinberg Cubase system, "doubled again, running in parallel," said Johansson. "A radial switch between them gives instant change-over if one fails."

Dallas Dahl is by title head of sound and runs monitor world, it being the more mission-critical part of the sound component to ESC. "This show is relatively easy - a maximum six vocalists to any entry, and backing music from Cubase: no live instruments. The XL8 is such a great sound board they all tend to be more than happy with the mix they get." Of course, considerable time is spent tailoring the mix to

each, "but few really know what to expect. And we have the new Sennheiser 9000 series radio mic system."

Dahl continues: "The big bonus is the lack of RF problems, with the wall of LED gone from the stage set. It's made my life so much easier that actually I find doing Sweden's internal ESC entry eliminators, the *Melodi* tour, is harder. There are three sets of six mics for the performers to leap-frog through - they all process via stage left, mic and ear final check, perform, and then exit via backstage right where they are relieved of their mics and IEM backpacks. We give them all their own set of ear buds, about 220 sets at the last count, which they keep and tend to fit early in the dressing room stage. The mics run straight to a passive analogue splitter; if, for any reason, a performer runs off with a mic or one gets dropped and broken, we can quickly add a substitute and repatch analogue almost instantly, so the feed channels remain unchanged at all the various desks. With the IEM backpacks, there are six sets of six in rotation, and we have over 100 packs for the dancers."

There are peripheral mixes too. "Outside of the arena, we supply a mix minus feed to the Green Room," said Johansson. "In here, we have rigged a Kiva system for the assembled performers to listen to what's happening out in the house and there are six hand-helds for quick ENG-style interviews. It's 'mix minus' in that it's a mix without the mic feeds of those six hand-helds used for the interlude chats with the host. This is managed from a Yamaha PM5D tucked into a corner of the room; it also provides a feed to the scrutiniser's room, from where the EBU judges monitor the performances. All entrants have the right to repeat their spot if something significant is not right, hence the scrutinisers. But really, the key to the whole performance is when the entrants first arrive and we give each a half-hour slot in the sound-check room, where we have a complete duplicate system with XL8, Sennheiser 9000 series mic system and IEM. That gives us, and them, the time to really nail down what they need to hear, and what we may need to address in terms of details, like belt-pack positions. Then they all go into the rehearsal period pretty confident of what's going on and we, Dallas especially, know what areas to keep an eye on."

Radio World

ESC is as good a launch platform as any manufacturer could wish for, and Sennheiser has never been shy in its commitment to the show, but to paraphrase a favourite saying of DiGiCo's Bob Doyle, 'if you're going to put your equipment on the table, you had better be certain what you can do with it'.

The bright new shiny thing in this instance is the new Sennheiser Digital 9000 series radio mic system, which was launched last year (see *LSi October 2012*) and Sennheiser's Jonas Naesby was on hand to run us through its advantages. "It's completely digital; the improvement in audio quality is the immediate benefit, it just sounds so much better. There's no problem with transients, and, instead of running through a compander and all that implies, you have full audio quality at all times. With a complete digital system there are no intermodulation problems,

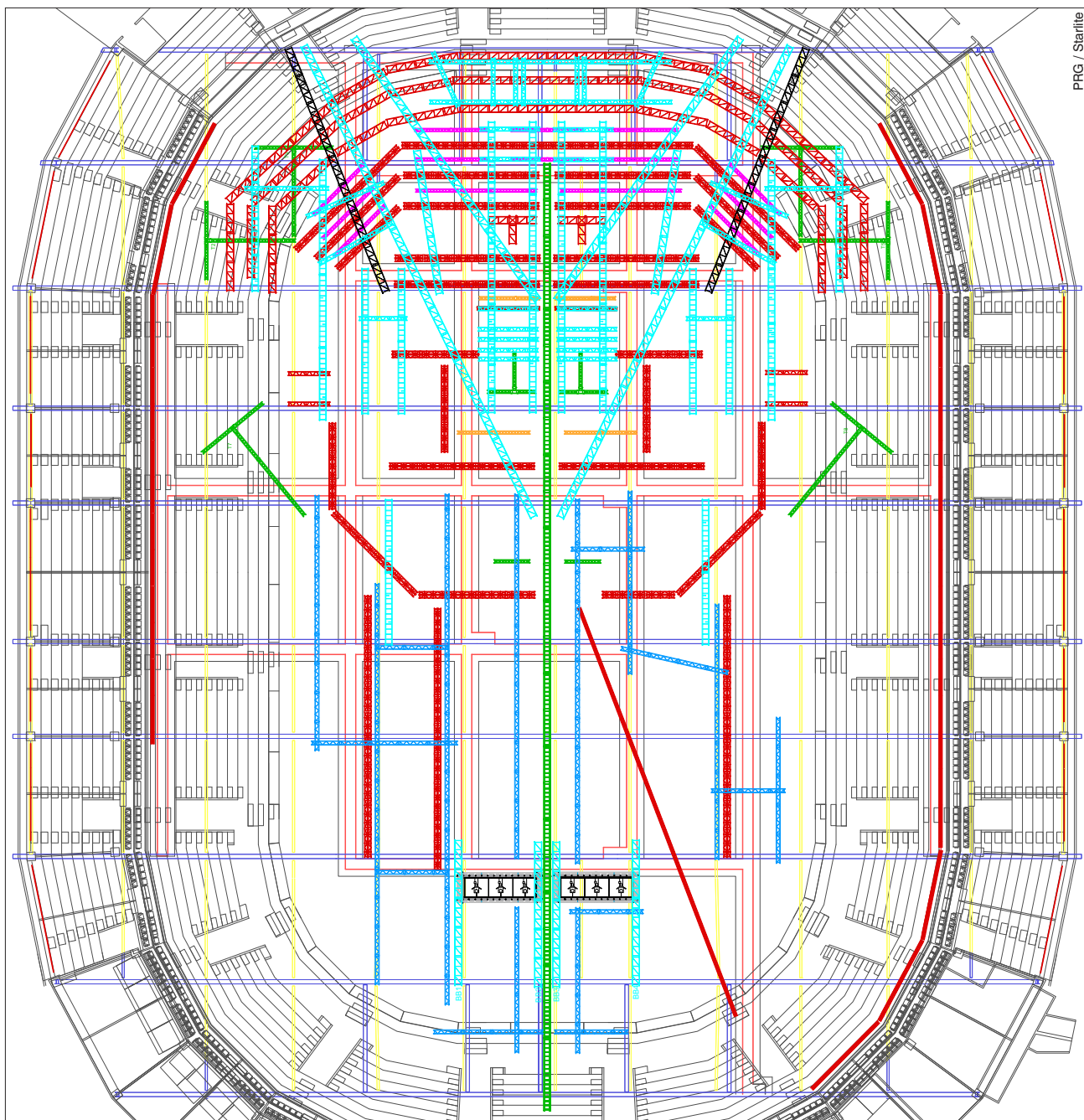
Sound Bites

● Arriving at Malmö, the rehearsal for the second semi-final was in progress in front of an audience of invited school kids. "The PA is a bit quieter than normal," said Oskar Johansson. "In Sweden, for audiences below the age of 13, the LEQ limit is 98dB with a 102dB Peak. We also have the subs turned off." Just four CD18s flown each side, and a pair of S2 below stage to warm up the front audience.

● I commented to Johansson that one of the performers was having trouble finding their pitch during rehearsals and could do with a bit of Autotune. "Not allowed, of course", he laughed, "unless it's as an effect, in which case that's quite acceptable, but never as a correction for a poor performance."

● The Sennheiser 9000 Series hand-held microphone has a newly developed capsule suspension, a double cradle of rubber spider that eliminates virtually all handling noise. It has an inherent passive dynamic adjustment designed into the suspension that means the harder it's hit, the more cushion the spider suspension provides. Very clever.

● Despite resistance from some big users, Sennheiser has finally gone for Li-ion batteries. "The price has come down to the point where it has no real impact compared to new battery cell," said Jonas Naesby, "and you get steady real power monitoring, so there's no guesswork. If you have a two-hour rehearsal, you know absolutely whether the charge will last or not." That's very reassuring.



Above: The master rigging plot.

which makes frequency management a lot easier on big shows like this. When you connect the antenna it automatically calibrates, so you don't need to set the booster gain. And you can select whatever sample rate you want - 44.1kHz, 48kHz etc: we're using 96kHz here. They take the captured signal and run it analogue, just so they can repatch in any mic, so that all the desks on the network see any sudden replacement mic come up in the place where they expected to see the defunct mic."

Had the loss of the LED back wall made radio management measurably easier? "Some of those LED screen makers have been listening to us and are producing screens that are much less of a problem these days," said Naesby, which was not quite the response I was expecting: so that's it video chaps, you're off the hook (some of you, at least).

"But," Naesby continues, "there are lots of moving parts on this show - electro-mechanical stuff all over the place - and what we have to

contend with is the sum of all those various radiation sources. Some locations around stage affect very specific frequencies which, needless to say, have been carefully avoided. The thing is, most of this stuff is switched on, and stays on, so you can't really detect what or where the source is. Avoiding it is faster and easier, and we have plenty of usable spectrum. The cameras generate some white-band noise - the stage right crane more than the stage left one, for some reason - and there's really no getting around that when they crane in close to the performer. That aside, everything else is about constructing a proper logistical plan to manage all the performers and change-overs."

Naesby generously added: "These guys have done it a few times before and really have that part nailed down, staying comfortably one song ahead at all times."

Conclusion

While the British always tend to view this show through the narrow perspective of a reversed

telescope - focussing only on the national interest - there's a strong argument here for taking it more seriously, thereby deriving more pleasure. The huge gay contingent that descend on the host nation each year certainly have the time of their lives. Besides, as Melzig said, "apart from sporting events, this is the biggest live TV show in the world."

The production polish that Melzig's assembled team brought to this event should not be overlooked. On superficial examination, the gig at first appears easy - just some giant karaoke broadcast. However, the illusion of the swan on the lake is relevant here: serene on the surface, while underneath people are paddling furiously - but (it has to be said) to stupendous effect . . .

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