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# Eurovision
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# EUROVISION SONG CONTEST LISBON 2018

Broadcast from Lisbon's Altice Arena, ESC 2018 was a triumph of international co-operation on many levels. Sarah Rushton-Read meets the production 'Eurovisionaries' that make it all happen . . .

Performance photography: Ralph Larmann

There is no show on Earth quite like the *Eurovision Song Contest* (ESC). A super-slick live broadcast event that outshines, by some distance, some of the biggest budget, pre-recorded, music TV shows on the planet. A masterpiece of precision planning, co-operation, communication, design and programming, *Eurovision* has to be - amongst many other things - the most spectacular showcase of the broadcast skill and technology you will ever see.

This year's ESC was contested across three live broadcasts to over 50 countries by 43 essentially amateur performers - almost none of whom had ever been part of a production of this size before. However, you'd never know it. Each delegation took ownership of the huge stage for their three minutes of fame and played to the camera with as much style and confidence as any seasoned professional.

Of course, what might look easy to the untrained, passive eye of the TV-watching public takes meticulous, year-round planning. Staffing, infrastructure, logistics, communications, health and safety, engineering, commissioning, designing and programming are cogs-within-cogs and wheels-within-wheels that must work together, often under huge pressure, to ensure the smooth sailing of the good ship *Eurovision*.

Broadcast from the Altice Arena in Lisbon, Portugal, ESC 2018 was a triumph of international co-operation on so many levels.

This is a show where each of the 43 songs needs to look and feel different; where precision lighting, varied scenery and fastidiously-choreographed camera shots create unique worlds for each performer to inhabit; where camera operators, crew and floor managers are invisible performers dancing to the score of the music; where scene changes between each three minute song are 35 seconds max; where sound has to deliver the perfect live mix to create an atmosphere that keeps the global TV audience captivated. With the exception of the one stage invasion, which showed that UK entry SuRie could weather any storm, it was a show so polished as to appear effortless to the 200 million viewers in 50 countries who tuned in.

So, who are the people that make Eurovision happen and how do they make the world's biggest live broadcast show work so smoothly? To continue the nautical analogy, one of ESC's leading helmsmen is head of production Ola Melzig, a well-weathered master of the complex logistical gymnastics it takes to deliver such large-scale events.

### PRODUCTION MANAGEMENT: OLA MELZIG

With barely a few weeks' break from ESC in Kiev last year, Ola Melzig and co-head of production Tobias Åberg began work on Portugal's production in July 2017. Over several months, Melzig and Åberg oversaw the formation of each departmental team and contracted every technical supplier of equipment and services.

Behind Melzig's laid-back demeanour and irreverent humour is a tireless perfectionist, manager and motivator of rock-solid teams, focused on ensuring that everyone involved in this huge production is well-informed, happy and able to deliver their part of the deal to the best of their ability. Warm but professional, busy but at ease, Melzig is the proverbial swan, gliding across the surface while out of sight, the paddling never stops.

In Lisbon, Melzig sits, relaxed in his open-plan production kingdom, the obligatory huge cardboard cow as backdrop, and surrounded by busy people. A large cured ham sits on a table packed with drinks, and a deep fat fryer (Melzig's priority order from Netherlands-based rental operation and main technical supplier, Ampco Flashlight) in which he cooks Dutch bitterballs for anyone who is around each day at 5pm.

It's easy to be dismissive about ESC, but you only need to delve beneath the surface a little to realise that this live broadcast production is a masterwork of human endeavour. Truly international, most of the highly skilled technical team, from the heads of production to lamp maintenance, speak at least two languages; many speak more. The potential pitfalls - language, culture, standards, even food - are deftly avoided, as Melzig and Åberg ensure none affect the well-being of his team or the well-oiled machine that is the ESC.

"As heads of production, we are responsible for lots of the fun stuff and some of the boring stuff, like sound," Melzig laughs irreverently. "We oversee organisation, rigging, lighting, staging, pyro, video and the building of the press centre, delegation bubble, OB trucks, distro and power, press conferences, catering - anything within the backstage area is under our umbrella. Technical managers for all the different departments report directly to us. It's bonkers!"

He continues: "We kicked off our time at the venue with a 20-day load-in. Then we were into tech rehearsal, then stand-in rehearsal, then artist rehearsals, then dress rehearsal and semi-finals and then final broadcast," he states, making it all sound characteristically straightforward. "Of course, what takes 20 days to build needs to come out and be on trucks in 72 hours because there's another concert coming in. We have known this since day one and we are prepared - there is a 2.5m long load-out schedule printed and on the wall."

It's not just Melzig's personality or the load-out plan that is large-scale. The Altice Arena had 220t of gear flown in the ceiling (a venue record), including 4km of truss, over 2,400 active lighting fixtures, 240 loudspeakers and 750 rigging points. It's huge: compare it to the biggest rock and roll touring shows, which might carry 100t max. "Bringing 250 trucks of gear into a very tight security enclosure is challenging," says Melzig. "The logistics just for the load-in
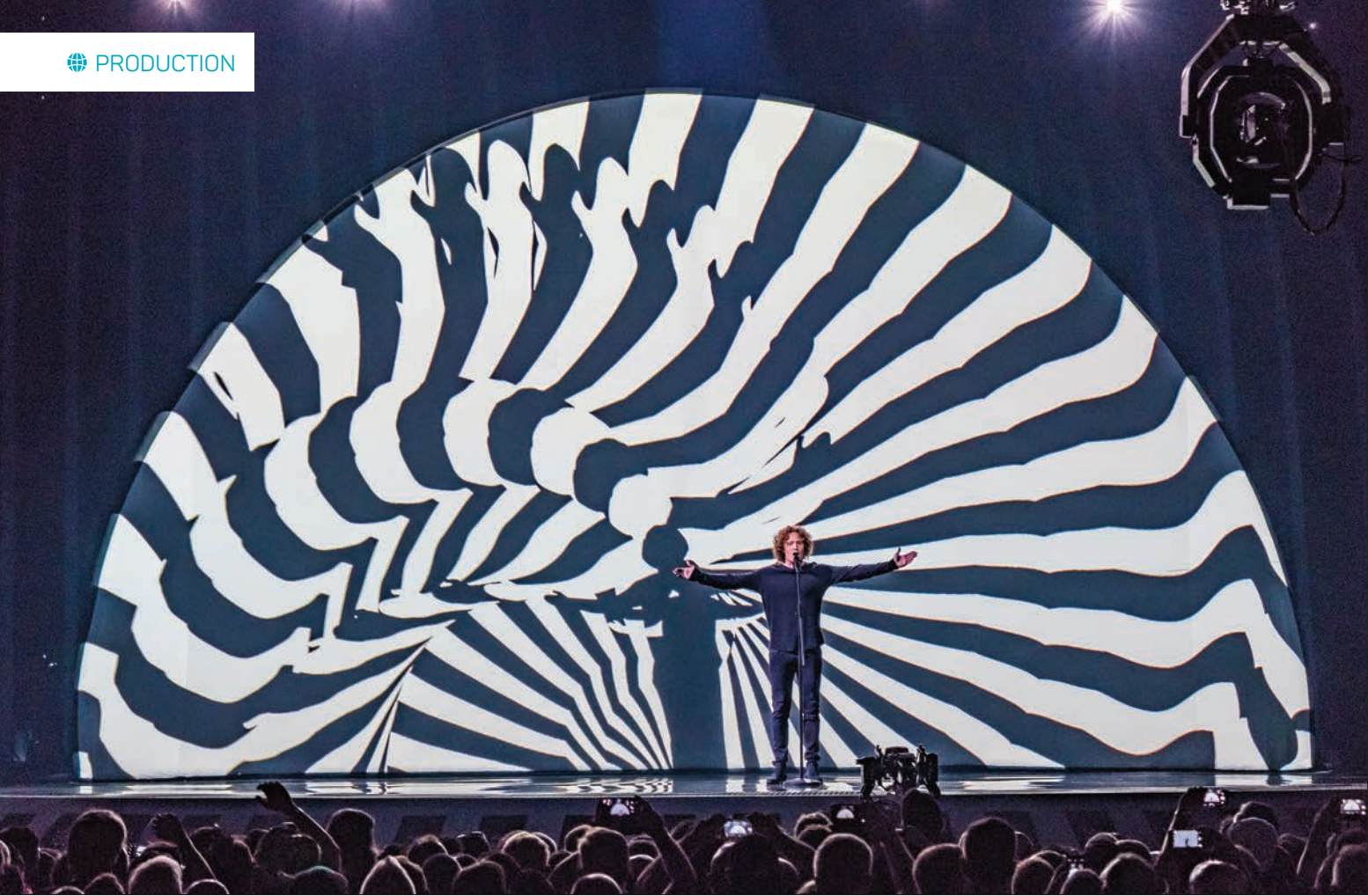
From top: Ola Melzig, head of production

Lighting designer Jerry Appelt

are complex. It has to come in in the right order so we don't build ourselves into a corner; so we can feed our crew; so we can build the truss but prep' the lights. Not only that, everything - flightcase and truck - has to be thoroughly searched by security."

Of course, managing all of this requires a faultless flow of communication that streams from the production heads to every member of every department and all the technical suppliers and manufacturers. This is achieved in a number of ways: the team even has its own app to ensure that everyone has access to relevant information, from the production schedule and technical plans, to what's for lunch and where to get it. Melzig and Åberg also cultivate an open, accessible culture within the production team, in which anyone can ask a question.

No one is out of bounds, as technical manager for video, Hans Cromheecke, points out: "The great thing about working for our 'supreme leaders' Ola Melzig and Tobias Åberg is that both ensure all team members are in daily contact with one another. They designed an open-plan production office for all show technical management, so if you have a question, you'll find them at their desks. Communication between all departments is borderless."

Melzig adds: "This is the largest music TV production in the world: no one does anything on this scale. It's all about communication, feeling good and doing well. We make sure I'm in the centre of things and have my eyes and ears open to the smallest of comments: you have to be alert. And when I know that a person or a whole department is unhappy, we deal with it head-on, rearrange priorities if necessary and see how we can redistribute resources to make things better."

Portuguese broadcaster RTP was keen to use local businesses, talent and skills wherever possible. "What has been particularly good this year is that we had plenty of time in pre-production, which allowed us to work more closely with local suppliers and, as a result, more than 75% of the whole production team is Portuguese," says Melzig.

Plugging into this management team is main technical supplier Ampco Flashlight, headed up by co-project directors Marc van der Wel and Marco de Koff, along with their Portuguese partners Pixel Light. "Ampco Flashlight has provided the CyberMotion automation system to Eurovision for the last 15 years, but this is the first time we're the main technical supplier," explains Van der Wel. "Our role is to plug into all departments and match the needs of the production with exactly the right expertise and equipment. This demands precision planning and an organised workflow, built upon a comprehensive and robust communication systems, often conducted in multiple languages!"

*" . . . the variable is always the voice of the singer. At FOH and in the OB van we must be prepared for potential changes, that's the skill. We must balance all these things to achieve the best result . . ."*

*Daniel Bekerman*

Responsible for all the lighting, motion, rigging and video needs of the production along with supplying a multi-skilled crew, Ampco Flashlight played a crucial part in the successful delivery of the show, as Melzig discusses: "When the design is agreed, our job is to identify what's required to realise it. We break it down into components and ensure that works within the framework of the budget. With expertise in the CyberMotion system, Ampco Flashlight is renowned for its efficiency and knowledge. They have an extensively-trained, multi-skilled crew, which means they can keep their teams small, flexible and efficient. This worked well for this show and with our local Portuguese crew and suppliers."

**SET AND LIGHTING DESIGN**
This year, ESC's nautical theme echoed Portugal's maritime history and - in response to the words of last year's winner, Salvador Sobral, that "music is not fireworks, music is feeling" - the Eurovision Broadcasting Union (EBU) and RTP dispensed with the ubiquitous large-scale LED video screens and gave a more traditional design brief.

Pitching together for the design were scenic designer Florian Wieder and lighting designer Jerry Appelt. The result is Wieder's beautifully layered, multi-dimensional and versatile stage design, sculpted and brought to life by Appelt's spectacular, sometimes theatrical, sometimes rock and roll but always rich and vibrant lighting design.

Wieder's lavish and elegant set reflects Portugal's maritime history. Upstage, large video-mappable, edge-lit 'ribs' resonate Portugal's shipbuilding history, while the stage design itself - comprising a series of 3D, video-mappable, LED edge-lit concentric circles - was inspired by the armillary sphere, a navigational device commonly used by early Portuguese navigators and also the centrepiece of the Portuguese flag. Bridges and an apron stage, along with a variety of scenic props and Appelt's rich lighting, delivered a flexible environment, ensuring each of the 43 acts could make the stage their own.

With no video, Wieder and Appelt's mission was to revive the physicality, emotion, meaning and intimacy of ESC. Describing the process, Appelt says: "The set and lighting design is agreed early on to give us time to contract the suppliers. We offer delegations a tool box of potential looks and environments to present their ideas and they feed back their ideas. It's then an ongoing negotiation process until the rehearsals end. Alongside, we also have to balance the needs of the delegations with the needs of the show. Always in the back of our minds is the camera shot - some of the more rock-style songs suit the big, wide-open looks, but others are more intimate and close-up; they don't need so much production. Every song has to have its own unique meaning and impact."

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## Light Initiative shines for SuRie



LED solutions provider Light Initiative (LI) designed and built the custom LED scenic element for the UK's entry, SuRie. LI worked with creative show director Dan Shipton of Black Skull Creative to develop the 18 video-mapped LED chevrons that created the 'corridor' of light behind the performer. The chevrons were designed to read as a flat visual from the front, then stretch out to show depth and distance when viewed from the side.

"As soon as I started researching the show design, I was on the phone to Light Initiative to discuss ideas," says Shipton. Through a series of calls, spreadsheets, technical sketches and, during one late night call, a bag of Lego, a couple of Kit-Kats and some Play-Doh, Shipton and LI director Bryn Williams fine-tuned the design, while also helping to ensure it stayed within budget.

Shipton says of LI: "They are always checking my costs, checking my technical delivery and making sure it will be OK. Most importantly, I never feel creatively restricted because they always offer solutions that enable the design development, even if budget forces me to move on from the initial idea."

The LED chevrons were custom-built steel frames in which LI integrated its BeamLED and StealthLED products. Each had its own distinct video-mapped content, designed by NorthHouse and installed onto the Hippotizer media servers for playback. Joe Ratcliffe, LI's build technician, was on-site throughout, providing on-the-ground support for Shipton and his team.

Williams says: "Working with Dan is a joy, he is open and collaborative . . . He is very good at having an overall vision whilst being adaptable enough to work within the boundaries of what is achievable."

◄ //lightinitiative.com

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Discussing his choice of lighting fixtures, Appelt says: "There is a partnership with Osram, but fortunately they have two brands that offer great fixtures - Claypaky and ADB. We have 750 of their fixtures in the rig. For key lighting and to supplement the 17 unit / 22 spot Robe RoboSpot followspot system, I use Claypaky's Axcor 900, and my workhorses are the Scenius Unico, the new Hepikos (which I use to frame the huge curved trusses with aerial beams), and the Mythos 2."

In addition, Appelt specified over 600 GLP fixtures, including the new KNV Arc. "They're damn bright," said Melzig. "It's best to put on sunglasses before these things come on."

Appelt also used 262 of the JDC1 hybrid strobes, deploying them in both the auditorium and all over the set to blur the boundaries between the two. "We were able to perform several tasks with one lamp," explains Appelt. "On the one hand there is the crisp white of the strobe tube, and on the other, the colour surfaces, which can be animated in segments or used to give huge colour washes."

⬆ From top: Daniel Bekerman, head of sound

Above: Ampco Flashlight's Marc van der Wel (left) and Marco de Koff

Delivering the final layer of lighting were 351 Ayrton MagicPanel-FX fixtures in the form of an expansive backdrop, which Appelt and his team called the 'Wall of Death'. These conveyed a variety of stunning looks, including starcloth-style twinkles, pixel-mapped effects and video layers, as well as dramatic beam effects through the scenic ribs and up onto the beautiful wooden roof of the venue.

Also new to Appelt's arsenal was the ground-operated Robe RoboSpot followspot system, which controlled 22 Robe BMFL Blades and WashBeams from backstage, supplied by Ampco Flashlight and Pixel Light. Robe's Martin Opitz took the role of RoboSpot systems engineer and, alongside Ampco Flashlight and Pixel Light, co-ordinated the training of 17 local operators.

With all technical elements of each song timecoded, cues were beat-perfect. The camera control system, CuePilot, ensured precise repetition of every camera shot and Appelt worked in constant collaboration with the team in the OB truck to ensure each shot was perfectly lit. "Eurovision is 99% lit as a TV show and 1% for the live audience," he explains. "That is not to say that there isn't a synergy between the two, and of course we need atmosphere in the arena for the TV pictures, but the camera leads the process."

Control was from six networked grandMA2 consoles (plus a fully redundant system, of course) dividing the various elements of the rig between them. Ampco Flashlight's Marc van der Wel discusses: "The network specialists in project manager Ruud Werkhoven's team worked alongside Jerry's right-hand man, Matthias Rau, on the network design. We agreed on a Maze network topology, which gives us the robust redundancy we need. Each switch/node has at least three connections, so we can lose two connections without loss of functionality across the system. It has to be absolutely faultless and run at the highest possible speed. The sheer number of lighting units mean we are pushing the MA control system to its absolute limits."

"We have 326 DMX universes running and MA said 'please don't add more' . . . We're way over the recommended limit, but then we always are," adds Melzig. "Florian's set and Jerry's lighting have brought an amazing contrast and depth to every camera shot. Of course, reduced video content has given Jerry more work, but thankfully he's proved he's up to the task."

**VIDEO**
Although video was vastly reduced, a number of delegations elected to include video, as Melzig clarifies: "When the creative decision not to have any video in the standard stage set-up was made, we challenged the delegations to come up with fresh ideas that would make their three minutes unique and, oh boy, did they go for it! We have so many props this year, it's not even funny. We also

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have some songs that feature video - but at the delegation's own expense. They still have to get it on-stage, plugged up and tested, then get it off in 35 seconds or less."

Technical manager for video, Hans Cromheecke supervised the video delivery by Ampco Flashlight, supported by Netherlands-based Faber Audiovisuals, content delivery for both audience screens and the delegations and manages relations between the delegation's designers and the technical teams. During the rehearsals and the show, he was the interface between the delegations, lighting designer Jerry Appelt and video programmer Nick Charalampidis (aka Nick the Greek).

Melzig says of Cromheecke: "Hans has many years of experience working on all sorts of huge projects worldwide; we have worked together a lot. He's a great people-person and he always has a massive stock of Belgian chocolates in his luggage . . . but that has nothing to do with anything."

Video elements included: 3D projection mapping, with seven Panasonic RZ31K laser projectors on Estonia's Elina Nechayeva's 52sq.m dress and on the German entry Michael Schulte's inflatable projection screen, and a projection-mapped mountain for Russia's semi-final performance. The UK song, powerfully sung by SuRie, employed pixel mapping, while ROE LED tubes were used by Australia and Sweden, ROE Black OnyX 2.8mm CB3 panels by Malta and Barco projectors for Belgium.

Media server operator Charalampidis, now a freelance programmer and director, says: "When some of the delegations chose to use their own video elements, I was taken on as part of Jerry's team." Charalampidis used Green Hippo's Hippotizer Boreal+. "The servers were bought by Faber, as commissioned by Ampco Flashlight. I also used two MA Lighting consoles for playback - one active, one backup - plus a pair of MA's NPUs (Network Processing Units)."

Explaining the management of the mix of 3D and LED content, Charalampidis says: "We decided to use two independent

systems - one was Green Hippo's SHAPE for all the 3D elements, such as Russia's mountain, Estonia's dress, and Germany's inflatable projection screen, and a standard Hippotizer for all the different resolutions of LED technology. All content comes directly from the delegations, however, we specify what we need in terms of resolutions and codecs."

He adds: "Lanz Short of Green Hippo came out and helped with the pre-production and workflow for all the video clips, ensuring the models and codecs were correct and that the mapping was on target."

Cromheecke says: "Working for *Eurovision* is like being part of a huge machine where every individual has to be at their level best in terms of competence and spirit. What makes it such a joy is the spirit and the will to find a solution to every issue and to keep it all going as a team."

**ARENA SOUND**
For experienced sound designer Daniel Bekerman, working on ESC has been a career ambition come true. "I've worked on some of the biggest TV broadcast projects in the world - Euro 2004, Asian Cup, Olympic Games - London, Sochi, Rio and South Korea, but this is one of those jobs where you get to really prove what you can do."

Bekerman, of Portuguese AV company Auditiv and his business partner João Escada, understand the idiosyncrasies of the Altice Arena well. "It's designed like a huge upturned boat and is mostly constructed of wood. It's enormous and can be acoustically challenging," he explains.

Even though the ESC production is firmly focused on the TV broadcast, Bekerman was determined to achieve an acoustically clear sound in the arena as well. "Our challenge is to give the live audience exactly the same intelligibility, even at low levels. We ensure a good sound inside the arena because we want a good feeling from the crowds to convey to the broadcast audience." The atmosphere was picked up by eight mics under

the PA, 14 mics around the arena and 5.1 mics in the arena, plus six mics on hand-held cameras.

Bekerman has been working in TV for 35 years and understands the expectation: "When I explained my system design to the rest of the team during one of our technical workshops, saying that I had 18 arrays and no cabinets in camera shot, I left with many happy friends!"

The PA comprised 18 arrays of L-Acoustic K2 and eight arrays of KS28, powered by L-Acoustic amps, as Bekerman discusses: "We did an end-fire set-up for the subs above the stage. Originally, I wanted to position the subs in one place, but this is a massive show with lots of camera positions, cranes and cable cams. In the end, we split the subs in two lines by having them as close as possible, and through the good use of delays we managed to keep the end-fire behaviour, thus significantly reducing the reverberation of the room - it's a great-sounding set up."

For redundancy Bekerman ran the PA with Dante, via two separate loops. "We have two analogue rings as well," he says. "We also have complete control of the amp power, so if an amplifier burns out we can immediately disconnect it - just part of the redundancy solution on the system."

Bekerman called on the experience of former ESC sound engineer, Oskar Johannson. "I wanted the advice of Oskar to fully understand the specific redundancies particular to *Eurovision.* In the first month, I designed the whole system so we could send a comprehensive specification to our suppliers, Sennheiser and Agorà. They were very helpful - they double-checked everything."

On site, Agorà supplied and maintained the audio network, consoles, controls, playback system and PA. Giulio Rovelli, managing director of Agorà, discusses: "For this kind of event, the key is to be plug-and-play. We worked closely with Daniel to ensure all technical pre-production was done in the warehouse

to minimise the risk on-site. The rigging and PA installation was supervised by the fantastic production and rigging team, and the production team were hugely supportive, so for us all was really fast and easy."

Bekerman is keenly aware that on a live broadcast, the singers have one chance to get it right. He comments: "No singer can sing the same each time: each rehearsal, each live show is unique. Although the effects for each song are pre-programmed to follow the show timecode, the variable is always the voice of the singer. At FOH and in the OB van we must be prepared for potential changes, that's the skill. We must balance all these things to achieve the best result."

There are four critical positions for sound - the soundcheck room, monitors, FOH and the OB van. Soundcheck is where the delegations go to check in-ear monitor (IEM) levels and make any adjustments to the IEM mix. "When the performer goes on stage, they have to be totally synchronised with the show timecode. Soundcheck is crucial because if the singers cannot hear well, then they cannot sing correctly."

So how does it work? "Each delegation's backing music has to be 28 tracks - 14 will be the musical tracks, then there will be tracks with voices, tracks with click track, tracks with effects. As we rehearse, we adjust the stems in a session and then re-record them until we have exactly the right combination for the FOH mix, the monitors mix and the broadcast mix."

In terms of IEMs, all the singers had a snapshot mix that is exactly the same every time. All the microphones are the same, all the IEMs are set at the same level. The only part that differs is the singer - how they sing into the mic, their energy level and so on.

Bekerman continues: "We have two sound engineers in the OB van, two on monitors and two in FOH (Robert Edwards and Henrique D´Assunção, João Escada and Tiago Mendes, Isaac Bugalho and João Paulo) - one does the show and

one is backup. We are in constant communication throughout the show, across a number of channels."

One crucial part of Bekerman's team training was how to manage a system failure. "Throughout the rehearsals, we play out scenarios. By the time we come to broadcast shows, if something goes wrong the team will instinctively know what the procedure is. Complete backup and redundancy are all very well but not much good if we don't know how to apply it! I created a number of faults during the rehearsals to see how the system and people dealt with it. I don't tell them I'm doing it. It stimulates some adrenalin in the team!"

Regarding the backing track, Bekerman specified three ProTools systems, running synchronously on Macs. Each was interconnected via two MIDI timecode networks. Should any one of the backing tracks be lost, the system will seamlessly cut to another and the singer will not notice that the machine has changed.

"In the OB vans we have Lawo mc66. We also have five DiGiCo SD7 desks, two SD10s and four SD11s and a few analogue desks to do shouts and such. Overall, that's 12 or 13 consoles working at the same time on the same network."

In charge of technical support for Sennheiser is Volker Schmitt. He comments: "We have 78 channels of wireless microphones and 32 channels of in-ears, using the Sennheiser Digital 6000 receivers, and Sennheiser 2000 Series transmitters. There are three in-ear monitoring antenna systems that cover the entire arena. Our biggest audio challenge is the venue itself. It's a round building with a roof that is built of wood and covered in aluminium."

Another issue for Sennheiser was the unauthorised Electronic News Gathering

(ENG) teams who bring in their own wireless systems. To avoid this, Schmitt and his team continually measured the spectrum. "We have an RF 'hunting season," laughs Schmitt "First we figure out if it's a gentleman or lady speaking, and then we hunt them down, often finding them in the press tent. When we find them, we take a photo of the accreditation and say - 'do this again you will lose your accreditation'."

**RIGGING**
Essential for every other department is rigging and in early January, Melzig commissioned Big Rig Berlin's Johannes Schau as production head rigger to look after ESC's rigging requirements as supplied by Ampco Flashlight, and installed by its rigging team led by crew chief Gerrit de Beuze.

Melzig says: "I knew the venue would present challenges and I needed someone who could not only solve the problems, but also deal with all the

different stakeholders and evaluate their needs, while keeping an overview of what is best for the production. Johannes is perfect for that. In addition, Big Rig Berlin has a highly trained, educated and experienced team of riggers and engineers, giving us access to a wide range of practical and theoretical knowledge, which is crucial when it comes to finding solutions that are outside the box."

Schau's role was, however, much more than rigging designer. He worked closely with the key contacts of all technical departments, including lighting, audio, video, motion control and SFX. "Many of them, such as gaffer Matthias Rau, have been working for ESC for many years," says Schau. "We worked particularly closely as lighting was the key design element in this show. I was also in contact with the venue's structural engineers for the structural approval and, of course, Tobias Åberg and Ola Melzig."

← Behind the 'Wall of Death', looking out into the arena

For Schau, the project began with meetings and technical workshops. "Afterwards, a lot of the further communications were carried out through detailed technical drawings. The drawings were shared with all stakeholders in an online cloud to ensure every department had access to the latest files."

Balancing the sometimes conflicting needs of the various technical departments was the main challenge for Schau. "We have relatively limited space and also a limited roof loading capacity, and that's what makes the process of designing the rig for *Eurovision* exciting," he says. "A big part of the solution is to understand the characteristics of the roof structure, so that the rigging design distributes the total production weight corresponding to the roof load capacity."

In order to ensure structural safety, a load monitoring system was requested. Schau worked with Marc van der Wel, Marco de Koff and the team from Ampco Flashlight. "Ampco Flashlight was looking for a supplier that could provide a large number of wireless load cells and they decided to commission the load cells through our rigging rental service, Big Rig Rental," says Schau.

In total, 177 Broadweigh load cell shackles were deployed to monitor a production weight of 220t, including the 'Wall of Death' at over 20t. Schau explains: "A tiny difference in the height of suspension points can cause a major deviation of load compared to the support reactions of the structural calculation. By monitoring the load cells, we were able to react quickly to these effects before the forces exceeded the allowable maximum and posed a safety threat."

For Schau, ESC 2018 involved some long working hours, especially in the pre-planning phase and the first week of the load-in. "Looking at the final result, I have to say that it was very much worth it.

Besides the outcome itself, I have gained wonderful experiences and met some amazing people," he says.

In terms of automation, Ampco Flashlight again deployed a CyberMotion system comprising 46 CyberHoist II motors controlling 14 moving trusses along with a falcon truss on 10 motors. "We have 12 arch-shaped trusses that fly in and out to give different looks in various modes," explains Van der Wel. "Clever touches include reversible trusses rigged on one side with Claypaky Scenius spots and on the other with Portman fixtures. LD Jerry Appelt and gaffer Matthias Rau came up with a concept that enabled the motion control team to switch between the two sides as required."

## COMMS
Crucial to the success of *Eurovision* is the communications backbone, and long-term ESC technical supplier Riedel Communications met this demand with a massive, all-fiber communications and signal distribution system. Its MediorNet real-time media network provided redundant and decentralised signal routing and transport from start to finish. Through tight integration with MediorNet, Riedel's Artist digital matrix intercom system and Bolero wireless intercom provided communications for crew and performers. For all broadcasts, including both semi-finals and the final, Riedel supplied the signal and communications backbone for Videohouse, which produced the show's world feed on behalf of EBU and Portugal's public broadcasting company, RTP.

Deployed in a decentralised configuration, Riedel's MediorNet network ensured fully redundant distribution of all video and audio signals for commentary, intercom, signal distribution, and radio communications, including the feeds for monitors in commentary booths and for displays and projectors in the Altice Arena.

## PYRO
Portugal's Grupo Luso Pirotecnia was commissioned by RTP to provide the pyro package for the production. Melzig says: "The biggest advantage is that they have exactly the right experience for the project. They are also local and know the venue."

Vitor Machado, executive director of Grupo Luso Pirotecnia, comments: "A big part of our brief was to interpret the delegation's requests and make them happen as they have imagined. It's a time-consuming project, but it's been satisfying to work in a dream team that brings the very best local and international crews and companies together in one place."

He adds: "It was great working with Ola. His long experience with ESC, the complexity of the rehearsal process and the relationships with the delegations, helped us a lot. We also worked closely with the head of the TV production team, deputy executive producer, Paulo Resende."

## CONCLUSION
ESC 2018 was another glittering success. Everyone involved, from performers to audience members, to production and delivery teams, makes it clear that *Eurovision* is built on a foundation of joy, collaboration, co-operation and friendship. Optimistic, multi-layered, atmospheric and addictive to watch, the show is driven by a behemoth of boundary-pushing international specialists who wring every bit of potential from the latest entertainment, broadcast and communication technology in the world.

Over 12,000 people a-night enjoyed three spectacular live broadcasts from Lisbon's Altice Arena, and on Final night, nearly 200 million viewers tuned in on TV, with many more millions watching online. The final 26 acts put on a remarkable show for both the live audience and the cameras, but it was Israel's Netta Barzilai who was the ultimate winner with her catchy pop anthem, *Toy*.

As the show comes to an end, a delighted but relieved Melzig reflects: "I can't recall a *Eurovision* production where I've laughed so much. It has been a real pleasure being here. The people of Portugal have been so friendly, generous, open and funny. They are crazy as bats and never on time - but they know about that!" ⊗