

# 14-18

## SPEKTAKEL MUSICAL



Mechelen, Belgium: Studio 100's *14-18 Spektakel Musical* takes place in a performance area the size of two football pitches, with mobile set pieces bringing the audience closer to the action . . .

Words & pictures by Louise Stickland

Belgium and Holland are hotspots of creative and imaginative ingenuity and talent in the technical production industry, and the opening of *14-18 Spektakel Musical* brings another world-class production right home to Mechelen - one of the many places embroiled in the death and destruction of the First World War which began a century ago in 1914.

A laser-controlled seating tribune that moves nearly 2,000 audience 90m up and down the 150m long performance space in Mechelen's Nekkerhal is just the start of the technical 'wow' factors. They continue with incredibly detailed and beautiful lighting by the 'painter of light' himself, Luc Peumans; an intricate 'floating' audio design by Marc Luyckx and Guido Olischläger and the genius scenography and set design of Stefaan Haudenhuyse.

Directed by Frank Van Laecke and produced by Studio 100, *14-18 Spektakel Musical* has involved some incredible teamwork, which has taken grim subject material and presented it as a watchable dramatic narrative that strikes the tricky balance between relevance, accessibility and great entertainment. It's an incredibly ambitious goal which they achieve with passion and diligence, telling a gripping tale of heroism, humanity and heartbreak against the backdrop of one of the deadliest wars in history. This is large-scale immersive theatre at its very best.

The action starts as soon as the last burn hits the seat on the grandstand, which is masked off completely from the rest of the vast, tube-like interior of the concrete-constructed Nekkerhal by a light curtain of Vari\*Lite VL5s. At that stage, walking in for the first time, you have an impression of a small space, but this soon changes. With the first strains of music, the house lights dim, the curtain dissolves and we go straight into the shock and awe of a battle scene - guns, explosions, chaos, confusion - rows of soldiers firing into the audience as the whole seating stand starts moving forward at a cracking rate of half-a-metre-per-second, pulling everyone right into the core of the action.

Unless you are there it's hard to imagine the enormous impact of this first movement. It has everyone clutching their seats for the next two hours! The seating tribune makes 13 moves back and forth throughout the show at different speeds and distances as the drama - sung live to a special backing track by Dirk Brossé and Allard Blom recorded by the Royal Flemish Philharmonic Orchestra - unfolds.

The technical planning for transforming the venue - built as a farmers' market and more usually used for exhibitions and

show-jumping events - started around three years ago when Frank van Laecke, Dirk Brossé and Allard Blom of Studio 100 decided to honour the dead of the First World War by creating this work.

They already had the idea of a moving seating tribune when they started talking to Hans Willems of engineering technology specialists Wicreations, based nearby in Heist Op Den Berg, with whom they have worked on many previous projects.

#### Automation

The unique aesthetic that the show's creators wanted to share with their audience involved taking them collectively in and out of the scenes and playing area. It is a combination of classic musical and movie treatments on a basic level, with the moving stand as the zoom of the camera, a vehicle for opening up the playing space and distancing the viewer from the action, or closing it down for additional intimacy.

Wicreations applied their usual mix of ingenuity and engineering magic to produce three major production elements: the tribune, the 11 moving and repositionable scenery wagons and the control systems. This involved three disciplines - the mechanical construction and design of the stand, the design and build of the set pieces and the automation and control of both. The process started in 2013, and with a separate project manager assigned to each element, has been a resource-hungry but extremely rewarding project.

The steel stand is 33m wide, 55m long and 7m high at the back and can accommodate 1,880 people with full wheelchair access. It weighs 135 tonnes empty and 270 tonnes at full capacity. The first of many sets of calculations undertaken were completed by external surveyors to establish the strength and integrity of the Nekkerhal floor, after which Wicreations and its R&D team started their part of the design process. A second phase of calculations dealt with the dynamic forces of the stand in motion which were checked and approved: every part of the structure was subject to these using Finite Element software.

The whole structure rests on 368 wheels, so getting these right was fundamental. Each powered wheel can hold up to 2.8 tonnes and the supporting wheels 3.2 tonnes. The structure is actually moved by 24 of Wicreations' rental stock drive motors which are based on UK manufacturer Kinesys' Evo system - each of these drives two sets of wheels. The maximum speed is 50cm per second and the movement is smooth so the acceleration and deceleration is almost imperceptible once the motion has started.



Clockwise, from top:

Hans Willems (L) and Geert Stockmans of Wicreations, automation.

Yves Vervloet, Wicreations, set project manager.

Guido Ollschlager, co-sound designer.

Luc Peumans, lighting designer.

Bart Caets, show technical manager

The stand's position is determined by laser eyes which locate it with millimetre precision in relation to 55 markers on 3m high poles anchored in the concrete and running down the length of the venue. These guide the stand and all the scenery trucks into the correct positions for each cue. The poles are located so that the laser eyes of every moving element can simultaneously see at least three markers and receive its correct positional coordinates.

The laser guiding control is a customised version of a system made by Swedish theatrical and opera specialist Visual Act, which has been specially hot-rodded by Wicreations. This monitors all the information in real time and, if necessary, adjusts the tribune's movement to keep it in a straight trajectory. The same Visual Act console working over Wi-Fi is used to move the set wagons.

An impressive cable festoon was devised to provide a neat and practical solution to manage the approximately 4.5km of cables needed to power the moving stand and run control data to lighting, audio and video equipment. With the stand and the FOH control positions moving, it couldn't just be plugged in and left like a conventional set-up. 120m of Wicreations' Wi-Track product was installed into the roof on the left of the tribune and the 175m cable festoon is attached beneath.

There are 46 different positional cues for the set pieces and tribune in the show which are executed by operators Sam Melotte and Tim Beckers. The innovative set, which comes together like a giant multi-faceted jigsaw to form numerous complex scenes, was designed by Stefaan Haudenhuyse, art director at Studio 100, who worked closely with Wicreations' project manager for set, Yves Vervloet.

The 11 automated set wagons, all of which have a minimum of two faces, are built from steel and move into multiple positions throughout the show. Two have hinged parts which lower on Kinesys vari-speed motors - also controlled wirelessly via the Visual Act system - into a horizontal setting to form the trenches. The capacity of the 11 wagons was calculated individually to ensure stability and strength.

The 6 x 2.7m bases of these set pieces are all customised. Each contains a state-of-the-art drive unit from Visual Act specially modified for this application and house all the technical kit including the laser navigation system, Wi-Fi receivers, batteries and power distribution to all the many practical lights integrated with each wagon/set piece. Wireless DMX data control for these practicals shares the same Wi-Fi network as the laser control for the wagons.

Constructed on top of the bases are eight different types of steel towers, some as large as a small house, which required extra parts to be added to some of the base frames. The towers vary in weight from 4.6 to 3.2 tonnes, and the strikingly detailed scenic elements designed by Haudenhuyse were built and finished by three different companies - Caramba Décor, Atelier C19 and Phixion - all commissioned by Wicreations. A key to aiding the smooth running of this was to produce very detailed sets of 3D modelling, a task undertaken by Vervloet and colleague Dries De Roey.

All communication for the set wagons is beamed via a dedicated 5GHz Wi-Fi network - installed by Wicreations in consultation with a wireless comms specialist - at the FOH position at the top and back of the seating tribune which ensures a strong and robust signal. The intense four-week, around-the-clock programming and commissioning of the complete system, right up to opening



night, was supervised by Wicreations' automation project manager Geert Stockmans.

#### Lighting

When it came to lighting the show, Studio 100 spoke to Luc Peumans from Painting With Light, one of Belgium's best known lighting and visual designers. Peumans has an impressive portfolio spanning music, theatre, large-scale musicals and spectaculars, and has also worked with Studio 100 on many previous projects. Their first conversations about the then embryonic *14-18 Spektakel Musical* took place around three years ago.

With the venue already earmarked, and as the idea of using mobile scenery trucks evolved, Peumans suggested using some simple lighting trickery to conceal these massive pieces when offstage by creating virtual wing space with light curtains. The same concept is employed to mask off different depths along the field of play as the seating tribune and the location of the action shifts up and down the hall.

There are left and right vertical light curtains and four horizontal ones made from a total of 465 Vari\*Lite VL5s and 28 bars of four ACLs - supplied, together with all the show's lighting equipment, by PRG Belgium. Sourcing the right fixtures to optimise the effectiveness of this plan was crucial, and Peumans wanted the light to resemble the look of the original DHA Digital Light Curtains. Most of the VLs are fitted with CT blue to enhance the cold atmospheres required for the war scenes.

A network of trussing was installed into the Nekkerhal by PRG to facilitate the overhead lighting positions, and distributed around this are 44 VL3500 spots, 38 VL3000 spots, 36 VL3000 washes, 36 Robe LEDWash 800s and 40 Martin MAC Viper Wash DXs (with

framing shutters). In addition to the moving lights, there are four Martin Atomic strobes, nine Dataflash strobes, 69 PAR 64 cans, 76 ETC Source Four PARs and 65 ETC Source Four profiles.

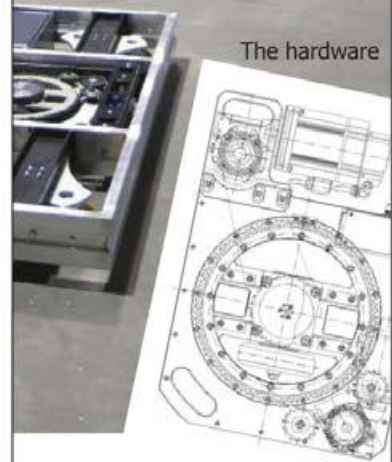
Eight 9m high scaffolding lighting towers run down both sides of the performance space, each with a followspot on top - a mix of Robert Juliat Aramis and Victors. An A-Team of four energetic spot operators dash between the eight positions during the show - depending on the location of cast members needing highlighting, the different scenery truck formations and the position of the tribune.

Rigged on the sides of each of these towers are four VL5Bs, two VL3500Qs and a Robe Cyclone - a high powered fan with a ring of LEDs. These are used for directing and helping to simulate the very specific 'toxic brown smoke' of the gas attack scenes.

As you might expect, to have an impact in this size venue, the smoke and haze requirements are impressive and also an integral element of the lighting brief. Eight Jern Glaciator 410 smokers, four Concept ViCount CO<sub>2</sub> crackers, eight Look Solutions Vipers and 10 Look Solutions Unique hazers are all combined with various emission techniques to produce a wide range of atmospheric effects.

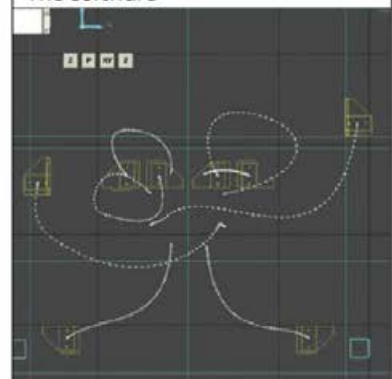
Similar levels of effort and detail went into making the visible set practicals: street, hospital, house and reading lights look authentic. Many feature vintage bulbs and authentic old industrial lighting fixtures sourced and reconditioned by Peumans and his PWL team. These further accentuate the detail and intricacies of the set elements. A wireless Art-Net system is integrated with Wicreations' communication system to control these fixtures, which are battery powered by the large units in the base of the trucks.

## 14-18 Spektakel Musical



The hardware

#### The software



**visualact**  
artistic computer technology

+46 (0)8 522 472 00 / vact@visualact.se

[www.visualact.se](http://www.visualact.se)



The show lighting and ambience has been meticulously and precisely crafted with many subtleties and great depth. Peumans makes the most of having the space and throw distances to create striking shadows and stark contrasts. Lighting is instrumental in helping simulate all the locations from home towns to hospitals and trenches and action on the battlefields, during gas attacks, at weddings and court martials.

Lighting and video is run by Cedric Eestermans from a grandMA full-size console with onPC as backup, and was programmed by PWL's Paco Mispelters who was also assistant lighting designer.

Ahead of moving onto site for the four weeks of full rehearsals, Peumans' team made a full WYSIWYG animated model of the show with director Frank Van Laecke and designer Stefaan Haudenhuyse which enabled them to block all the scenes in advance and arrive pre-prepared. This helped ease some of the pressure during this very intense period as well as being necessary for programming the automation during the acting rehearsals.

"There were many challenges working in a found space rather than a conventional theatre, but that's also what made it so special," explains Peumans. "It was imperative that we found ways of focusing the audience's attention on specific elements and dialogue in many very complex, busy and physically large scenes".

As with everyone involved in the production that I spoke to, he is rightly proud of the results.

#### Video

Video projection adds a backdrop layer to the visual picture, playing a vital role in creating perspective. Whether it's a fabulous sunny day, a twilight scene or the horror of bombed and burnt towns, homes and obliterated landscapes - it brings an important extra dimension: heightened perception.

The content was designed by Haudenhuyse as part of his complete scenic picture - with much of it sourced from the Belgian Military archive and produced by Leuven-based New Solid. Three Barco 26K projectors rear-project onto the screen, and an additional machine mid-way down the auditorium is used for an extremely life-like waterfall scene near the top of the show.

Painting With Light provided the Coolux Pandoras Box media servers storing and replaying the video, which was programmed by Katherine Selleslagh. All the cues are triggered by the grandMA2 - some via timecode and some manually.

#### Audio

Sound was co-designed by two freelance engineers, Marc Luyckx and Guido Olischläger, both of whom have worked on several other Studio 100 projects. The initial idea was to have the sound installed on a grid above the tribune that would move with the stand, but for sight lines it was decided to move the PA to the venue ceiling.

This introduced a whole range of complexities to the audio brief in that the PA had to sound perfect for the entire audience, even as they change position beneath it. All the gains and delays in each of 108 Coda VIRAY speakers arranged in 36 arrays had to be dynamically fine-tuned for each movement so the sound is effectively "floating" in the air as the audience moves.

The original solution - the first time it has been done - was to use a 64-way matrix system based on a TiMax Sound Hub, into which all the surround mixes from the main sound console are fed, and this follows the movement of the tribune - getting positional information from the wireless communications laser guidance control system.

The TiMax adjusts the PA arrays according to the tribune's position and speed and also switches the speakers utilised for the surround effects accordingly. Every 12m is a PA line with a set of new channels and start positions relating to the relevant speakers. This incredibly

sophisticated task took several months and 'an amount' of experimentation to perfect!

The monitors and surround speakers consist of 44 Coda G-series and there are 18 flown Coda SCVF subs, together with eight double 18" Coda extreme high output subs in the base of the tribune. The latter are fantastically authentic for all the rumbling and high-shock battle sound effects and also help disguise the notion of the tribune moving.

Seven Coda D5s at the front of the tribune are used as front-fills for the first rows of audience, with Coda G308s utilised for cast monitoring. All the speakers are driven by Coda's new Linus amplifiers. Numerous brands were auditioned for the show for this, and in the end it hinged on the specific 120° vertical dispersion needed to deliver the requisite sound to all seats in all positions, especially at the back of the stand.

The backing track was recorded by the Royal Flemish Philharmonic at Galaxy Studios in Mol. Olischläger remarks that the Coda VIRAY's performance is so good that the tracks need virtually no EQ through their system. He is using a DiGiCo SD5 console which is completely full with around 60 mixes, including 12 in-ears for the principals. The SD5 was chosen for - among other things - the amount of re-assignable ins and outs and its handling of surround audio.

All the singing is live and the mics are 32 very discreet Sennheiser MKE1 miniature clip-on lavaliers, taped to the faces of the principals and ensemblers, running on a Sennheiser Digital 9000 system, keeping the signal digital throughout. The 9000 system was selected for its uncompressed digital, high clarity sound. To save on belt-packs and to ensure they maximise their use of the available RF spectrum, there is some swapping of these during the show.

The show track is replayed via Q-Lab show control synch'ed to the lighting, pyro and DSM cues by LTC timecode, with MIDI timecode linking certain lighting cues where relevant to the point effects. All equipment has been supplied by Studio Halifax.

The curved concrete Nekkerhal has also undergone some serious acoustic treatment to help the show's incredibly lucid sound, where the balance between the live voices and orchestral track is so good that you don't realise the orchestra is absent.

Belgian drape and soft goods specialists ShowTex provided hundreds of metres of made-to-measure flame retardant stage textiles for dressing, including a very effective 14 x 60m acoustic curtain hanging between the lobby and the theatre space which helps optimise the sound quality. This perfectly flat three-layered wall comprises acoustic baffles sandwiched between two layers of Molton

and features a giant print integrated on one side to enhance the aesthetics. The side edges of the Nekkerhal are completely masked with two Molton curtains, each measuring 160m long by 7m high, and ShowTex also supplied the bespoke 11 x 45m black BP screen which is the main backdrop.

Off-white Molton curtains and two fabulous custom-printed chandeliers help transform the lobby into a First World War exhibition, with the impression of war continuing right into the VIP area via an army tent constructed from Juncko material. All these production elements combine to transform the massive barn-like venue into an intimate and personal space where the cast can communicate with the audience almost on a one-to-one basis.

The show has been a huge success with the first set of dates selling out immediately. After a summer break - where the Nekkerhal honours a previous booking - they have an option to continue until 11 November - Armistice day.

With over 17 million deaths and 20 million wounded, the First World War was one of the deadliest conflicts in human history. Of those deaths, around 10 million were military and 7 million civilian. This amazing production has been inspired by each and every one of them.

## Our 3 most advanced innovations

# VIRAY



- Patented Dual Diaphragm Planar-wave-driver
- ViCOUPLER
- Sensor controlled subwoofer

The compact VIRAY system will change the way you think about loudspeaker systems forever.  
Coda Audio making music more enjoyable

 [www.codaaudio.com](http://www.codaaudio.com)