



# The new sound

The historic Royal Festival Hall complex on London's South Bank has reopened with a lavish refit, as **Simon Croft** reports



Sidebox loudspeakers (Innox Audio SF-104) are positioned on some of the projecting audience boxes (Kirkegaard Associates)

Following a complete refurbishment lasting two years on a budget of £111million, London's Royal Festival Hall reopened with a lavish ceremony on 8 June.

The ambitious project has restored the iconic Grade I listed building to its original modernist glory, while significantly upgrading its acoustics and facilities, returning the Hall to its rightful place as one of the world's great concert venues.

The Royal Festival Hall opened in 1951 as part of the Festival of Britain, an event intended to help a nation to shrug off the austerity caused by World War II and turn its sights to the future.

Due to a shortage of raw materials at the time of construction, much use was made of reinforced concrete, which is not the easiest of building materials to modify after the event. In addition, fear of creating an overly echoic space in the unusually large hall led the original designers to opt for what turned out to be a notoriously muddy-sounding room, which makes it difficult for singers and musicians to hear properly.

Despite this, the prestigious venue has hosted concerts by a glittering array of world-class performers in all genres of music over

the years. The Southbank Centre as a whole includes several recital rooms, exhibition spaces, restaurants and cafes, as well as a variety of other areas.

## The project

The two-year project embraced the full refurbishment of the building, interior and terrace, by architects Allies and Morrison, while Kirkegaard Associates has been responsible for radical improvement of the auditorium's acoustics.

Northern Light was responsible for all production lighting, sound and communications, plus the speech reinforcement system. The specification was written by theatre consultants Carr & Angier and acoustic consultant Kirkegaard. Northern Light developed the design of the installation in response to these specifications.

Also contracted were Max Fordham as electrical consultant; Stagetech for overhead fly and stage engineering control; Belstar, which designed and fitted the stage lifts; and Bailey Teswaine, which installed all the Ethernet cabling required to make the site operate as an integrated whole.

As far back as 1987, US-based Kirkegaard Associates undertook a survey of performers

**'There was extensive testing and we had to create new materials'**

who had worked at the Royal Albert Hall before turning its attention to the issue of remedial work.

"First and foremost, it starts with our ears," says Larry Kirkegaard, the company's president and chief acoustician. "Then our voices; asking questions of others who had experience of the hall. It really begins and ends there. All the measurements simply help to inform. We built physical as well as computer models. There was extensive testing and we had to create new materials. We even developed fabrics specifically for this."

Although all the materials were removed from the auditorium until it had been stripped bare, everything had to be lovingly restored and replaced. Part of the challenge

was to create fittings that looked original but had quite different acoustic properties – hence the development of new fabrics.

Elsewhere, the lightweight fibrous plaster panels used to form the iconic waved ceiling in the Hall were completely remade to match their original shape but in a solid, reflective material. The grooves in the elm Copenhagen walls were filled in with tiny ebony strips to reduce absorption without undermining their characteristic profile.

"One of the rules of engagement was that everything had to remain as authentic as possible and where changes were permitted they had to be in the spirit of the original," says Kirkegaard. "It took us all of our creativity and imagination to work around it."

Paradoxically, Kirkegaard Associates' success in making the auditorium a more enjoyable space for musicians and music lovers potentially made life more difficult for Richard Laidman, senior consultant and associate at the company who was involved with the public address system.

"The system is mainly for speech and announcements," Laidman explains. "For larger sound reinforcement applications they will tend to use touring systems, so the performance of those is out of our control."

"The room has to have long enough reverberation time to give life to classical music, but longer reverberation time makes speech less intelligible. So, speakers are pointing at people, not on the walls, and the energy levels are kept as low as possible, so as not to excite the room."

In recent years, 'line array' speaker systems have become popular for concert sound reinforcement, as they have the ability to project a coherent waveform that is much more focused than with conventional speakers. In rock music applications, a lot of the attraction is that sound levels are higher at the back of the venue, but in the Royal Festival Hall the benefit is that the carefully controlled lobes of sound do not bounce off the building's surfaces. The steerable line arrays are EAW DSA 250, with the internal processors of each one set by a central computer. "The system had to be well hidden so that during classical performances, there is no sense of there being loudspeakers in the room," Laidman notes.

Intelligibility is also maintained by treating the auditorium as a series of zones, each under independent control. The object of the exercise is not just to ensure even volume levels. By delaying each signal by a carefully calculated amount, it is possible to time-align the system, reducing the echoes that can be caused by multiple sound sources. The result is "a very coherent body of sound" according to Laidman.



Acoustics consultants Kirkegaard Associates used physical as well as computer models of the auditorium

“The main digital controller is a Symetrix SymNet, which handles signal routing,” he adds. “Every one of approximately 30 zones has its own EQ, delay and level control. The Symetrix also handles signal routing and there is a built-in automatic mic mixer, so that the system can be operator-free.”

While the speech system is intended for anything from announcements to light instrumental support, “there is quite a bit of connectivity throughout the room,” Laidman explains. “Additional portable speakers and microphones can be placed as required and routed to the speech system or the main mixing console of a larger system.”

#### Developing the spec

“Northern Light won the contract in a competitive tender situation,” explains marketing manager Lois Ferguson. “The client was ISG Interior Exterior, who was the main contractor.” The contract was apparently worth in excess of £0.5million.

Ferguson estimates that there was roughly a 50/50 split between predefined spec and Northern Light development. “Carr & Angier produced a performance specification document which Northern Light then developed,” says Ferguson. “We followed the Kirkegaard specification and then developed the user interface in-house. In addition, we produced specially manufactured socket boxes and created a custom-built stage management desk, which is contained within a portable flightcase-type structure.

“Northern Light had to work extremely closely with architects Allies & Morrison as the venue is a Grade I listed building,” Ferguson notes. “In addition, the brief by Carr & Angier incorporated the need to increase flexibility and efficiency, while maintaining low ambient noise. We used ETC Sinewave dimming because of the silent

operation and ability to accept practically any load.”

Key components included a variety of control products from ETC; a GrandMA lighting desk from MA Lighting; Intelix MZP paging processor; Sennheiser infrared system for the hard of hearing system; and Netcira Audio Ethernet converters. In addition to the EAW DSA 250 steerable line arrays, there were a number of JBL horns used and a range of Innovox speakers. QSC amplification was chosen.

“The merit of using ETC products was really all about the silent operation in a highly tuned auditorium,” Ferguson says. “Also, ETC’s Unison Control integrates well with the GrandMA lighting desk. We used Intelix to enable multitask paging; there was great integration between Symetrix processing and the Intelix paging processor.”

Beyond the hall itself, Advance Systems installed a voice evacuation system, which Northern Light then integrated through the paging system.

Throughout the remainder of the year, the Royal Festival Hall is hosting a busy programme of musical events embracing a diverse array of classical, jazz, traditional Indian and flamenco. The new sound of the auditorium has been the subject of considerable critical acclaim, although Larry Kirkegaard says that it will ‘mature like fine wine’ as varnishes and other surfaces become harder and even more reflective over time. The musicians too will learn how to get the best from a room that looks very familiar but sounds completely different.

“There have been a number of articles in the architectural press,” Kirkegaard notes. “One of them said: ‘Where I have been listening for years to a pea soup, there is now a clear golden broth.’” **IE**

- [www.alliesandmorrison.com](http://www.alliesandmorrison.com) ■ [www.kirkegaard.com](http://www.kirkegaard.com) ■ [www.northernlight.co.uk](http://www.northernlight.co.uk)
- [www.carrandangier.co.uk](http://www.carrandangier.co.uk) ■ [www.maxfordham.com](http://www.maxfordham.com) ■ [www.stagetech.com](http://www.stagetech.com)
- [www.belstar.com](http://www.belstar.com) ■ [www.baileyteswaine.co.uk](http://www.baileyteswaine.co.uk) ■ [www.eaw.com](http://www.eaw.com)
- [www.symetrixaudio.com](http://www.symetrixaudio.com) ■ [www.etcconnect.com](http://www.etcconnect.com) ■ [www.malighting.com](http://www.malighting.com)
- [www.intelix.com](http://www.intelix.com) ■ [www.sennheiser.co.uk](http://www.sennheiser.co.uk) ■ [www.netcira.com](http://www.netcira.com) ■ [www.jbl.com](http://www.jbl.com)
- [www.innovox.co.uk](http://www.innovox.co.uk) ■ [www.qscaudio.com](http://www.qscaudio.com)



Portion of stage-lip horizontal (passive) line array for speech system front-fill: this runs the entire width of the stage with 172 Aurasound NS3-193-8A drivers (nominal 3-inch); array enclosures are on slide-out ‘drawers’ to permit their use with and without additional stage thrust (Kirkegaard Associates)