

VISION OF THE FUTURE

Bar-Ilan's Wohl Centre is Israel's first building designed by architect Daniel Libeskind. In keeping with its unorthodox design, its A/V system is something special, as **Tim Goodyer** reports

AT FIRST SIGHT, IT SEEMS TO BE a strange place for such an exceptional building. Bordered by roads on the border of Bar-Ilan's new North Campus, the shimmering golden Wohl Centre is the first building in Israel designed by internationally-renowned architect Daniel Libeskind, whose work includes the master design for New York's Ground Zero and the acclaimed Jewish Museum in Berlin.

But on second sight, and considering its intended use, the site of the new building proves to be perfect – the Centre will serve as a venue for prestigious academic gatherings, lectures and national and international conferences, and also provide a cultural site both for the university and the neighbours. 'We wanted the building to be just outside the campus to reach out to anyone', said Professor Moshe Kaveh, president of Bar-Ilan University at the centre's opening press conference at the end of October 2005.

Founded 50 years ago, Bar-Ilan University is now Israel's largest and fastest-growing faculty. The Wohl Centre is one of 16 buildings to be completed on the North Campus between 2000 and 2005. The 3,600-sq metre structure contains a multi-purpose foyer, three 200-seat lecture halls and a spectacular 900-seat main auditorium – the largest on the university campus. It was constructed with the support of Maurice and Vivienne Wohl and is dedicated to the memory of Vivienne, who died earlier in 2005. Donor representative and project controller was engineer Moshe Cogan who supervised the project throughout the construction period. Project



During the tuning procedure, a Dodek is used as an ideal omnidirectional sound source.



The Wohl Centre – The book-shaped auditorium is supported by two almost-rectangular boxes. (photo: Yoni Reif)

manager on behalf of the Bar-Ilan University was engineer Jakob Weinberger from Vinko YEFT.

The skeleton of the Wohl Center consists of a huge box in the shape of a book that is open to the sky – the auditorium – and is supported by a spine made of two nearly-rectangular boxes. There are no other columns supporting the structure. Daniel Libeskind calls his project *The Voices and Their Echoes* and, in describing the building, he says: 'Voices and Their Echoes stands for the focal point, which brings together the two essential components of Bar-Ilan University – the secular and the sacred. Apparent in the form of the Wohl Centre is the interrelation between the dynamics of knowledge and the unifying role of faith.'

While from the outside the auditorium looks like a book, from the inside the architect has sculpted it to resemble a valley with irregular shapes and no parallel walls. 'It is part of the functional disposition of spaces and angles in this particular space vis-à-vis the stage to give an intimacy to all visitors listening to a speaker or to a performance, even if the hall is not completely full,' Mr Libeskind explained at the press conference.

To meet the acoustic requirements of performances ranging from lectures to symphonic concerts, lead acoustician Abraham Melzer suggested using a system of variable room acoustics. Traditional systems accommodate

differing acoustic requirements by changing the position of moving panels, or by opening or closing reverberant acoustic spaces around an auditorium. These solutions were excluded because of their cost. Instead, the Variable Room Acoustics System from Level Control Systems was chosen. 'Clinchers for the system were the quality of the system, its flexibility – it can be integrated into a media or show control system and can also serve the main PA system, for example for surround sound – and the experience of the supplier, MediasPro', explains Ronen Brookstein, managing director of Barkai Benny Brookstein.

Barkai supplied and installed the VRAS system and the accompanying A/V technology on behalf of consultant engineer Dubi Harpaz and the Bar-Ilan University. For every installation in Europe or the Middle East, MediasPro provides an expert group with room acousticians, sound engineers and software specialists that teams with local experts, partners and/or project leaders. Brookstein is convinced that the key to good acoustics in multipurpose halls lies in the use of interdisciplinary teams.

VRAS is a regenerative acoustics system that picks up the stage sound and the diffuse sound in the auditorium, processes them and distributes them through a large number of wide dispersion speakers in the ceiling and side walls, into the diffuse field of the audience area.

This process is repeated thousands of times, leading to an increase in reverberant energy. In addition, the stage sound can be used to increase the amount of early reflections, as these determine the spatial impression of a room and improve the transparency of its sound. The additional reverberant energy and early reflections add to the natural acoustics just as moving panels or reverberant acoustic spaces would do. Neither the audience nor professional measuring tools are able to detect whether the acoustics are created by the room itself or by the regenerative system. One precondition for a natural impression, is to integrate the speakers invisibly into the walls and the ceiling.

The irregular shape of the centre's auditorium and its lack of parallel walls help mean that flutter echoes are not an issue. However to be a good hall, the auditorium not only has to be free of echoes, noise and distortion, but has to meet criteria like reverberation time (measured as RT), clarity (C80), spaciousness (IACC), intelligibility (ALCons), intimacy (ITDG), warmth (bass ratio), strength (G) and surface diffusiveness. To enable VRAS to perform the expected acoustical modifications of the hall, all of these parameters had to be addressed and distortions eliminated.

Based on the technical drawings and information from the architect, acoustician Mischa Antek from MediasPro used Ease

computer simulation software to model the acoustic properties of the hall in a 3D-representation. By virtually locating the sound sources in the room, he computed acoustic parameters and properties at listener seats and in the audience areas. Then with an auralisation, the acoustic properties at the individual locations were made audible. The auralisation allows engineers to 'listen' to the room before it is built or the sound reinforcement system installed.

The overall reverberation time of the centre was predicted to be just above 1s. This is optimal for lectures but not for musical performances, which require a longer reverberation time. With the help of the simulation, Mr Antek identified undesirable reflections close to the hallway, upper and lower balcony and some sidewalls that would lower the clarity of music and the intelligibility of the spoken word. To address them, absorbers were added in the walls and ceiling.

The upper and lower balcony also needed special treatment, and sound reinforcement was provided in these areas. As the distance between the back seats and the ceiling is rather small compared to the hall radius of the loudspeakers, the number of speakers per area was increased. Thus for the same overall sound level, the sound level of the individual speakers in this area can be decreased so that the sound source can no longer be localised by a listener. In addition,

the seats were upholstered to provide a similar acoustic profile whether they are empty or occupied.

For the reverberation function of the VRAS system, 12 beyerdynamic condenser cardioid microphones, and 27 Fohhn CS08 loudspeakers and six WHD UP-26 ceiling-loudspeakers were fitted in the ceiling above the entire audience area. Four beyerdynamic MCE86 II shotgun microphones above the stage pick up the early reflections here, which are distributed from the side walls by 19 Tannoy in-wall loudspeakers. As the core of the acoustics system, three Matrix3 mainframes from LCS were equipped with plug-in cards for VRAS, input, output, DSP and communication.

To meet the acoustic requirements of the auditorium, Franz Fleischanderl (acoustician), Bernd Noack (sound engineer and programmer), and Markus Ackermann (product specialist) from the MediasPro team, and Barkai's project team headed by Shy Kadmon (CTO) and Itzik Karako (project manager) derived six system settings. These are Speech, Drums/Percussion, Jazz Ensemble (for live bands and ceremonies), Dramatic Vocal/Small Ensemble, Chamber Music and Symphonic Music (for orchestras with up to 40 musicians). 'The Speech setting shows how the system can improve the situation both for the speaker on-stage and for the audience', says MediasPro

managing director Joachim Schwarz. 'With this setting we don't change the short natural reverberation time of the hall; all we do is add early reflections which lead to a higher clarity and density of the hall acoustics. The advantage of this setting is that speakers get "feedback" from the hall, while there is only a minor decrease in the intelligibility. This feedback makes it easier for the speaker to talk – he is more relaxed. For the audience the speaker and his or her voice appear to be "bigger" and it is easier to hear.'

All system settings can be selected by a button push at the Crestron Electronics Quick Media project control system.

'We didn't think the acoustics would turn out like that,' admits Shmuel Gan-EI, engineer and deputy director general of the university. 'The quality of the hall now is much better than what we thought could be achieved. It has the quality of many other renowned concert halls worldwide.'

His confidence was supported by the spontaneous applause after a demonstration of the system at the opening ceremony. The Wohl Centre is already the second successful VRAS installation in Israel in a short time. 'Both projects – the auditorium in the Wohl Centre and the one in the Performing Arts Centre in Herzliya – are acoustically very ambitious, says Mr Schwarz. 'But VRAS's architectural acoustics has

proven to work perfectly in all sorts of rooms – as long as preconditions like short reverberation time and lack of echoes and distortions are given. For architects this means more creative freedom without giving up good acoustics.'

In addition to the variable acoustics in the auditorium, the Wohl Centre offers flexible A/V facilities in all of its halls. 'The university wished to be able to run the auditorium, the lecture halls, and the foyer as stand-alone units with full audio and video equipment and, at the same time, to be able to combine any of these rooms as small units or even operate the whole centre as one complex unit', says Dubi Harpaz. 'The general idea was to keep the structure of the operation system and the handling of the whole installation as simple as possible. Everyone should be able to operate it.'

For ease of use, the system is divided into five subsystems covering the foyer, the three smaller halls and the auditorium. In each of the smaller halls, two of Toa's new HX-5 speakers are used while, in the auditorium, six Tannoy V15 speakers and a VS18DR subwoofer have been installed. The halls are supplied with 8X200 Bittner amplifiers, beyerdynamic microphones, DVD and VCR players, video projectors from Sanyo, motorised screens from Draper in the smaller halls, and a large (9.50m x 5.50m) custom motorised screen from AV-Stumpfl. In the main auditorium, a



Musical dedication: –The Israel Kibbutz Orchestra at the opening ceremony. Conductor was Doron Salomon (Director and Principal Conductor of Israel Sinfonietta).

9m-long LED display for Meymadim, Israel, is positioned above the screen to present or translate headlines or speech. A Siemens smart building system based on InstaBus components controls the lighting in the different subsystems, according to a further set of presets. At the same time, manual access and bidirectional interface with the overall Crestron control system are possible.

For international events and easy foreign-language media coverage, a simultaneous translation system (based on Cloud Electronics' Pump Station system) has been installed. In addition, special communication points have been lined up in each hall where journalists can choose a language from the translation system, record the original sound in the hall and transmit the data to their editorial office in real time.

As a control and routing platform, Crestron's new Media Manager system allows all the A/V technology at the centre – including the VRAS system – to be fully integrated into a single system. Furthermore, with Crestron's Cresnet and Media Manager technology, the Cat5 cabling infrastructure could be used to connect the controllers in the different subsystems through a TCP/IP network. For distribution, control and processing of the audio signals in and between the different subsystems, a Biamp AudiaFlex platform is integrated into the Media Manager system. The platform is running on CobraNet over Ethernet.

Crestron's new Quick Media TPMC-15QM touchscreens are used for system operation. Each subsystem can be controlled from the lecture stand, from an assistant at the rear of the room or from a remote touch panel. In addition, all audio, video, or control signals can be routed from each subsystem to any other subsystem throughout the centre. The management system also has access to the university network, and can run files directly from any server on the campus. In the future, the system can be upgraded to allow video conferences to be held from each subsystem at the same time.

The whole A/V system was implemented in less than four months. 'The installation shows how important it is to have an integration partner like Barkai, which not only has the technical knowledge but also the experience to translate this knowledge into a project', Mr Harpaz said after the opening ceremony. 'Technical problems can be solved on the long-run, but the basis for the success of a project is what I call "the human engineering of the operation system"'. In Israel, Barkai again proved to be the number one contractor for such ambitious high-end A/V projects.'

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From left: Engineer Shmuel Gan-EI (deputy director for Construction and Development, Bar-Ilan University), engineer Jacob Weinberger (director, Vinko YEFT), Professor Moshe Kaveh (president, Bar-Ilan University), architect Daniel Libeskind, engineer Moshe Cogan (Maurice Wohl's representative for the Wohl Centre project), architect Hanan Pomagrin (The Heder Partnership, Tel Aviv, local associate architects for Studio Daniel Libeskind on the project).