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SEIZE THE POWER

ITC Holdings Corp.'s headquarters boasts 'electric' AV.

BY SHONAN NORONHA, EdD

The new headquarters of ITC Holdings Corp., an electricity transmission company in Novi MI, features a super-sized, ultra-high-resolution projection system in its Operations Control Room (OCR), which monitors a multi-state electricity transmission grid. The company's trusted AV integrator, IGI, specializing in large-scale display solutions, was contracted to design and build the system. The AV design and installation work also included a training room that is configured like the OCR, a boardroom with a 10-foot-wide rear-projection and videoconferencing system, a 400-seat auditorium with full AV and VTC capabilities, mobile media and collaboration carts, and a system for distributing satellite broadcasts and signage throughout the six-story building.

Critical Monitoring

During the past five years, ITC has experienced accelerated growth and currently provides 25 billion watts of electricity to more than 13 million customers in five states, through more than 15,000 miles of transmission lines.

"We worked with IGI to design and build a control center that would enable us to efficiently manage and monitor the entire system, in real time," said Joe Bennett, director of facilities for ITC. "The operators in the OCR are fed time-sensitive data displayed by the Sony projectors in ultra-high resolution, 24/7, so they can assess and address

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The boardroom is equipped with full AV and videoconferencing capability. A custom designed and fabricated folded optics projection structure was used to shorten the required throw distance in the boardroom, as can be seen in the photo on page 38.

any critical issue that arises threatening the reliability of the electricity grid." The OCR currently features a front-projection screen measuring 109'4" wide by 15' high that was custom designed, fabricated and installed by IGI. Ten twin-stacked Sony 4K SXRD SRX-S110 LCOS projectors, 14 nVidia Quadro Plex graphics engines and seven RGB Spectrum MediaWall 2500 video processors ensure a brilliant, clear image and continuous display.

Eight operator consoles are situated approximately 17 feet from the display, referred to as the Map Board. Each console is equipped with a computer and dual LCD monitors for local display of auxiliary information, such as line load and a voltage graph. A console for the supervisor is located approximately 29 feet from the map board. The Training Room has two operator consoles.

"Image clarity was of utmost importance because the operators have to monitor large amounts of fine text, symbols and grid lines," explained Pat Hernandez, president of Commerce MI-based Immersion Graphics, the parent company of IGI. The system is capable of simultaneously displaying 20 images, each at a resolution of 2048x1080 pixels. Each projector displays four combined images, at a native resolution of 4096x2160 pixels. The 15.5-pixel-per-inch resolution provides sufficient clarity to enable viewing of text, line graphs and symbols from any location in the control room. "With the OCR we've built, our operators get a clear picture of what is happening where, allowing them to manage and direct resources as needed," noted Bennett.

Accelerated Expansion

ITC's rapid delivery of electrical service into new areas made it necessary to build-in flexibility for expansion in the OCR. When the company started, they owned the transmission lines in Southeast Michigan, and then acquired most of the Lower Peninsula of the state and continued to expand into portions of Illinois, Indiana, Ohio and Iowa. "With every new purchase of an electricity grid, ITC needs to integrate the monitoring and control of the new grid into their HQ control grid or map board," explained Hernandez.

The OCR map board will eventually be expanded to 160' wide by 15' high. This will be achieved by removing the wall between the OCR and the adjacent Training Room, and extending the front-projection screen to the combined size of the current two control grids.

The Training Room is designed as a scaled-down, yet fully functional, separate control system to serve as a backup for the OCR. The front-projection screen in this room currently measures 36'8" wide by 9'8" high. Dedicated Sony 4K SXRD projectors in the projection room display the training information.

Design Criteria

The challenge was to develop a visual display solution that would provide legibility for an enormous amount of data, from operator consoles 17 feet from the screen and the supervisor console, which is 29 feet away in the OCR. The system had to be flexible, as well as easy to expand as the company added new transmission lines. System reliability was of paramount importance because of the critical data to be monitored on a 24/7 basis.

"We had to figure out the best solution in terms of image quality, reliability and cost-effectiveness," Hernandez said, noting that the new OCR represents a departure from conventional design. "Typically, control rooms of this nature are designed using multiple rear-projection video cubes," he said. "With the overall estimated size of the screen measuring nearly 1600 square feet, the sheer number of cubes that would have been needed to operate this type of system made that option impractical, and it would not have been cost-effective. With the advanced performance of the Sony 4K projectors, we were able to achieve the necessary pixel density."

Additional benefits resulting from the use of front projection included the elimination of numerous display cube window mullions, simplification of color balance issues between displays and the creation of a continuous, borderless display image across the entire screen. This continuous display was achieved using RGB Spectrum MediaWall processors and nVidia Quadro Plex visual computing systems.

"We also estimated that using these ultra-high-resolution projectors and related equipment resulted in a cost savings of more than 70% for ITC," Hernandez reported.

Redundancy And Reliability

The entire projection system was designed for 24/7 operation. Twin-stacked 4K projectors ensure reliability and redundancy by alternately cycling the projectors within each dual stack every eight hours, around the clock. Both lamps in each projector are used during each eight-hour cycle to provide adequate brightness. All projectors are powered using triple-redundant power sources. An application on the OCR supervisor's computer also shows the status of the system, with an alert warning if there is a projector failure, so that the projector can be switched or IGI contacted. Another level of redundant backup is provided by the Training Room, which can serve as a fully functional replacement for the OCR system should the need arise.

The projectors are installed on custom-designed IGI stands in the second floor projection room. Each projector stack has four fiberoptic video feeds, an exhaust vent and control system cables. Five full-size equipment racks with all the audiovisual and control equipment, as well as HP ProLiant servers, are installed in a climate-controlled server room. "We built all the racks for the systems and tested all the equipment in our shop before installation," Hernandez reported.

GUI Design

The OCR system is completely controlled with an IGI custom-programmed AMX web-based solution. "The Control Room required a more technical graphical user interface than the boardroom and auditorium did," said Steve Harman, IGI service and installation manager. "The GUI was designed to provide status on projector operation and service modes. Our programming

Five 4K projectors fill ITC's nearly 110-foot-wide screen with critical, real-time data. (Editor's Note: For security reasons, the image on the power distribution grid in this image is composited for illustration only.)

also had to take into account projector error reporting/analysis, auto start/stop/rotation of the projectors at specific time intervals and real-time power status monitoring."

The user controls for the boardroom, auditorium and digital signage system had to be simple to operate. IGI selected AMX 8.4-inch touchpanels for ease of use. The AMX controls all system on/off functions, audio and video switching, the multi-window video processors, transport controls of all video source devices, projectors, audio system configurations, lighting system presets and other functions.
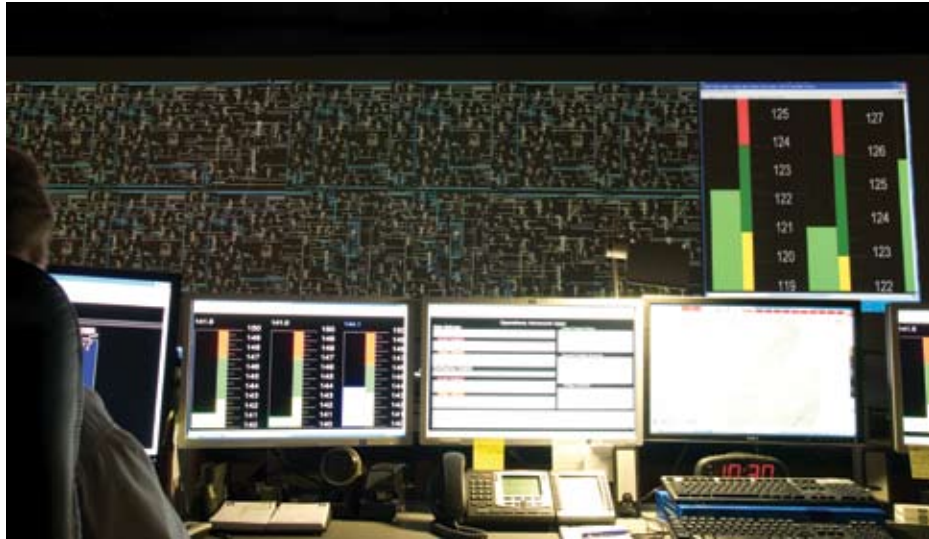
"We knew the end-user could be anyone, from an IT person to an executive, so we worked closely with ITC to develop a touchpanel layout. We used the same GUI look and feel throughout the facility, so ITC employees would eventually become familiar with the system, whether it is in the corporate boardroom or one of our mobile Multimedia & Collaboration Carts," reported Harman.

Hernandez explained that a Q&A approach was used to simplify user operations. "What we've learned through experience is that, although there is a lot of functionality built into control systems, the end-user utilizes only about 5% of that functionality. So we designed all the primary functionality onto the first page [screen] that presents three selection options, and then guides the user to the next selection," Hernandez said.

Collaborate And Present

Both the corporate boardroom and the auditorium include Polycom 8000 series VTC systems and full AV capabilities with AMX NI-3100 system con-

trollers and wireless touchpanels.

In the boardroom, a Christie HD6K projector coupled with an RGB Spectrum Multi Window Processor fills a custom 120"x68" rear-projection screen. An IGI custom designed and fabricated folded optics projection structure was used to shorten the required throw distance. Klipsch surround-sound and Tannoy ceiling speakers provide a versatile aural environment.

The auditorium system focuses the output of another RGB Spectrum Multi Window Processor through a Digital Projection Titan 600 HD projector onto a 160"x90" screen. IGI also fabricated a folded optics projection structure to shorten the required throw distance in the auditorium.

A Polycom Vortex digital sound processor supports an audio system that includes multiple Sabine wireless mics, and 1600 watts of Crown amplification provide plenty of power for JBL program and ceiling speakers. Two Vaddio WallView70 Cat5 pan-tilt camera systems deliver local video to a Polycom 8000 series codec.

Digital Signage

ITC's 188,000-square-foot new building also features high-definition TV/video distribution over Cat5. An AMX multi-format Endeleo digital signage solution is used to deliver satellite news broadcasts, real-time stock ticker quotes, cafeteria menu of the day and other timely announcements. Twenty Sony 40-inch LCD monitors

Immersion Graphics Inc.

In 1998, Pat Hernandez founded Immersion Graphics in Commerce MI to meet the growing need for large-scale, high-resolution rear-projection systems. During the past decade, Immersion Graphics has been designing, engineering, installing and servicing large-scale systems for the automotive design community, higher education, medical facilities and financial institutions, as well as the United States military and several other government agencies.

In 2008, this minority-owned firm responded to the growing need for customized advanced visualization, 3D rendering, media and collaboration systems by launching IGI, a division that designs and builds unique solutions for large enterprises and institutions. "Our IGI division is focused on command and control and advanced visualization applications," said Hernandez, president and owner. The company also expanded their presence with a new office in Indianapolis IN.

IGI designs, engineers, fabricates, installs and services large systems, like the high-resolution front-projection solution created for ITC. "We also designed and installed a 60-foot-wide, ultra-high-resolution visualization system for the Ford Motor Company in Dearborn MI. Ford's Electronic Design and Presentation Room features three 4K projectors that allow the company to visualize either three full-size, 3D digital car models or two full-size, 3D digital truck models on the screen simultaneously for design comparison," explained Hernandez.

Other notable customers include Chrysler, Toyota, Nissan Design America, Gulfstream and Goldman Sachs.

For additional information, visit www.werigi.com.

Equipment

CONTROL ROOM

Projection
1   IGI custom control room projection screen 109'4"x15'
10   Sony SRX-S110 SXRD 4096x2160, 10,000 lumen projectors

Computer, Graphics
10   HP Proliant servers
10   nVidia Quadro Plex 1000 visual computing systems model 4
5   RGB Spectrum MediaWall 2500 real-time video/data wall processors

Fiberoptic Connectivity
28   Gefen DVI-1000HD sender, receiver units
28   Gefen 4-strand multimode LC-LC fiberoptic link 330'

User Stations Aux Information Systems
10   NEC MultiSync 20WMGX2 20" LCD monitors w/tuner, speakers

Control
1   AMX NI-3100 NetLinx integrated controller
3   Hewlett Packard Procurve 2510-24 24-port switch

Support
4   Adderview AVX4016IP KVM switches
14   Adderview computer access modules
5   APC SU045X163 30A 200/208VAC transfer switches
5   APC SUA750RM2U rackmount UPS
5   Furman PL-PRO Series II 20 amp power conditioners
5   Middle Atlantic WRK-44-32 44RU racks

TRAINING ROOM

Projection
1   IGI custom projection screen 36'8"x9'8"
2   Sony SRX-S110 SXRD 4096x2160, 10,000 lumen projectors

Computer, Graphics
4   HP Proliant servers
4   nVidia Quadro Plex 1000 visual computing systems model 4
2   RGB Spectrum MediaWall 2500 real-time video/data wall processors

AUDITORIUM

Projection, Structure
1   Digital Projection 3-chip DLP 1280x720 HD format projector w/lens
1   IGI custom PowerWall Structure w/folded optics, screen w/trim 160"x90" image

Video
2   Extron RGB 468xi architectural interfaces w/AAP opening for 4-gang wall box
1   JVC DR-MV99B DVD/VCR combo
1   Polycom VSX8000 codec
1   RGB Spectrum QuadView XL multi-window processor
2   Vaddio WallVIEW 70 pan/tilt/zoom camera systems

Audio
1   AMX MVP-8400 8.4" Modero ViewPoint touchpanel
1   AMX MVP-WDS Modero ViewPoint touchpanel wall/flush mount docking station
1   AMX NI-3100 NetLinx integrated controller
1   Crown CDi 1000 amp
1   Crown CTs 600 amp
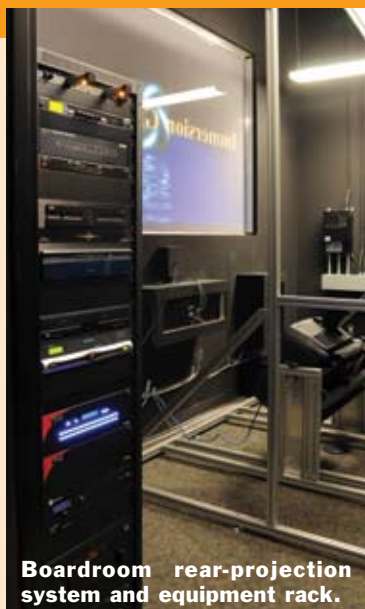
Boardroom rear-projection system and equipment rack.

18   JBL Control 328CT ceiling speakers
2   JBL MS28 compact, 2-way, full-range speakers
1   Linksys EZXS55W 5-port auto-sensing switch
1   Polycom Vortex EF2280 automatic mic/matrix mixer w/echo, noise cancellation
1   Sabine FBX2400 dual-channel feedback eliminator
2   Sabine SWM7215-H-U-M1 dual handheld wireless systems
1   Sabine SWM7231-L-U-M1 dual lavalier wireless system

Support
1   Furman PL-PRO Series II 20 amp power conditioner
1   Middle Atlantic ERK-4425 44RU equipment rack w/accessories

BOARDROOM

Video
1   AutoPatch Optima 16x16 RGBHV matrix w/stereo audio
1   Christie HD6K 1080 HD 6500 lumen 3-chip DLP digital projector
1   JVC DR-MV99B DVD/VCR combo
1   Polycom VSX 8400 videoconferencing system
1   RGB Spectrum SuperView 4000 multi-input display processor
1   Sony BDP-S1 Blu-ray/HD-DVD player
2   Vaddio WallVIEW 70 pan/tilt/zoom camera systems

Audio
1   Crown 280A dual-channel, 80W, 70V amp
2   Klipsch R-5650-W in-wall surround speakers
2   Klipsch RB81 bookshelf speakers
1   Klipsch RC7 center channel speaker
1   Klipsch RSW-10D subwoofer
1   Sabine SWM7131-L-U-M1 2.4GHz wireless system w/lavalier
9   Tannoy CMS601 DC BM in-ceiling speakers
1   Yamaha RX-Z9 9.1 channel digital receiver

Support
1   AMX MVP-8400 8.4" Modero ViewPoint touchpanel
1   AMX MVP-WDS Modero ViewPoint touchpanel wall/flush mount docking station
1   AMX NI-3100 NetLinx integrated controller
1   Furman PL-PRO Series II 20 amp power conditioner
1   Linksys EZXS55W 5-port auto-sensing switch
1   Middle Atlantic ERK-4425 44RU rack

DIGITAL SIGNAGE

2   AMX UDM-1604 Endeleo multi-format distribution hubs
20   AMX UDM-RX01 Endeleo multi-format receivers
4   AutoPatch 10-61 Cat5 transmitters
20   Chief PRO-2095 tilt wall mounts
4   Extron P/2 DA2 Plus 2-output VGA-QXGA distribution amps
1   Middle Atlantic 15" LCD/keyboard/mouse
1   Rose Vista KVM switch kit
20   Sony 40" 1366x768 LCD monitors

IGI MULTIMEDIA & COLLABORATION CARTS

3   AMX MVP-8400 8.4" Modero ViewPoint touchpanels
3   AMX MVP-TDS docking stations
3   AMX NI-2100 NetLinx integrated controllers
3   Extron Crosspoint 300 42HVA 4x2 RGBHV/audio matrixes
3   Extron MDA 3AV 3-output composite video w/stereo audio mini distribution amps
3   Furman PL-8 Series II power conditioners
3   IGI custom 65" portable videoconferencing, presentation systems
3   JVC DR-MV99B DVD/VCR combos
3   Linksys EZXS55W 5-port auto-sensing switches
3   Polycom VSX8400 videoconferencing systems

List is edited from information supplied by Immersion Graphics Inc.

are installed throughout the building—in the lobby, auditorium, cafeteria, employee entrance to the building, coffee stations and in the executive suites.

To handle ad hoc AV requirements anywhere in the facility, ITC also deployed three IGI Multimedia & Collaboration Carts equipped with 65-inch Panasonic plasma displays, AMX control systems, Polycom VTC codecs, Extron switchers and distribution amps, Furman power conditioners and a JVC VCR/DVD player.

Rapid Response

ITC's fast-paced expansion led to an accelerated design and installation schedule for IGI. The new headquarters building was built in about a year from ground breaking to the control room's operational start-up and full occupancy. However, IGI had only two months to install the entire OCR and training room systems, and another two months to complete the auditorium, boardroom and digital signage installations. This challenge was met by addressing many of the anticipated new construction installation issues in advance, and through extensive pre-planning and staging of the installation project.

"ITC brought us in at the concept stage—even before they broke ground, and we worked closely with them every step of the way," noted Hernandez. "We created a full set of infrastructure and component layout drawings for all the systems, down to the wire. We put a tremendous amount of logistic resources behind this project, and had a full slate of engineers, technicians and programmers working on the job. We also were at the site every single day during the construction and developed a good working relationship with the general contractor and other trades."

The result of all the planning and work was a mission-critical system that was delivered on time to a very satisfied customer. As ITC continues to expand and evolve their need for advanced AV applications, IGI will be there every step of the way to help keep the power flowing. ∎