BROADCAST
DESIGN

ACENTECH
ACOUSTICS TECHNOLOGY VIBRATION

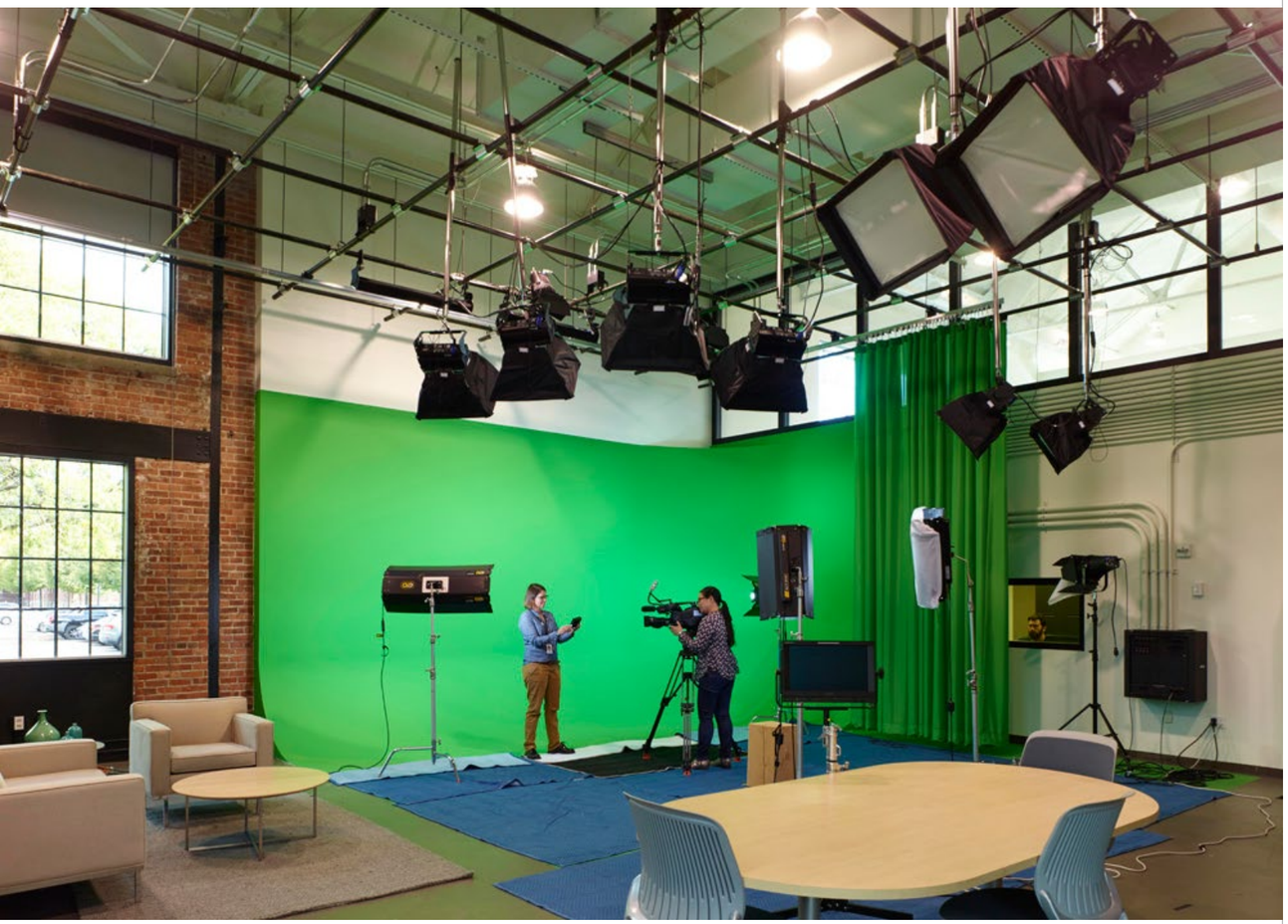
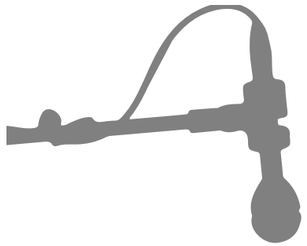


PHOTO: **athena**health studio. Architect: Charles Rose Architects. Photo: John Edward Linden.



Studio Design Best Practices

and why they are important

Broadcast is the distribution of video and audio media over cable, the internet, corporate LAN, Facebook, YouTube and many other delivery platforms. A studio is built to support the talent and equipment needed to make content that looks and sounds great.

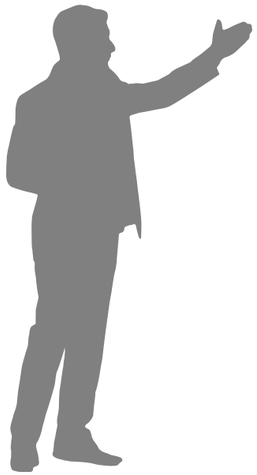
Let's talk about some basics. Great sound is essential to your media production. And now the art of capturing great sound for broadcasting can range from a simple wireless microphone to a stage that is fully wired for pickup.

With all those microphones picking up sound, it is important to keep the background noise down while the recording is in progress.

Which is where planning for acoustics, audiovisual equipment and IT infrastructure enters the frame...

Programming is KEY...

Acentech's broadcast consultants typically go through these steps to determine your program:



- Interview stakeholders to discover what type of media they are producing and how they intend to distribute it.
- Survey the space they have to use. Look for potential acoustic issues that may arise.
- Talk about technical approach and interview production staff (if there are any).
- Discuss MEP design considerations.
- Talk about project budget range.
- Identify all communication and media creation goals.
- Discover scope of film and/or production lighting and assist with power distribution strategy and instrument selection.

UPPER: Eastern Connecticut State University, Goddard Communications Building. Architect: Miller Dyer Spears. Photo: © Robert Benson.
LOWER: Sacred Heart University, Martire Business & Communications Center. Architect: Sasaki. Photo: © Anton Grassl/ESTO.

Sound + Vibration Considerations for Studio Sites and Buildings

Site

Concern:
Exterior noise and vibration

Review:
- Proximity to large transportation sources (airports and rail lines)
- Survey of existing noise and vibration conditions
- Noise produced by deliveries to the site

Building

Concern:
Noise produced by facility equipment and other tenants

Review:
- Structural systems for low noise and vibration
- Existing structure vs. new construction
- Single vs. multiple tenant occupancy
- Emergency power systems (UPS, generators, load banks, PV+battery systems)
- Resiliency considerations (installing transformers on elevated structures)
- Noise and vibration analysis of MEP equipment noise in sensitive spaces

Fit and Finish

Concern: :
Acoustic comfort and critical listening

Review:
- Impact of noise produced by in-room production equipment
- Sound reflection analysis, sufficient absorption for low room decay time
- Effect of technical furniture and production equipment on critical listening

AV + IT Requirements for Studios

You cannot build a complete studio without having a great layout that has space enough for technical staff, furniture, monitors, ceiling clearance for production lighting, green rooms, and storage. And then there is green screen production and AR graphics — all production elements that require space and infrastructure planning.

Also, there's the backbone of the systems that closely resemble what you would see placed in a data center. You will need fast data networks, cooling, and a robust internet.

Broadcast bandwidth requirements get high quickly. With the obvious need for a very reliable network, a fiber optic distribution system becomes standard in a broadcast project.

RENDERINGS: NBCUniversal Regional Headquarters, Needham, MA. Architect: Gensler

Data Centers and IP Infrastructure

All broadcasting centers will have a control room. The nature of the equipment supporting the control room will have substantial impacts on the design of supporting electrical and HVAC building systems that power and cool the room: for example, whether computers and servers that process the broadcast are on-premises in a server room or data center, off-premises and hosted in the cloud, or a hybrid of both.

These building systems will require a mechanical room for the power and HVAC equipment (in the building) when on-premises. Whether or not the control room is on- or off-premises, there will still be bandwidth requirements, both in the building on the local area network (LAN), **or** access to the cloud through the internet service provider (ISP).

This single fundamental programmatic question needs to be addressed early in the project lifecycle. Often times, it comes down to operations expense or capital expense. If it's a capital expense, the server room is usually part of the building systems. If it's an operation expense, the building systems required to support the control room can have a smaller demand on the supporting building systems (power and cooling). When keeping equipment on-premise, the quantity of monitors, video displays, computing and server equipment, and video switches and audio mixers determines the power and cooling requirements. When this equipment is in the cloud, specialty equipment is still needed locally in the control room.

Our team of project managers and system designers are here to walk through this process with you, and can map out the server room and control room to your desired configuration.

In summary, Acentech's consulting staff will help you navigate the decision making process to build a studio capable of producing the media you need to create. We provide integrated design consulting for all of the services listed above, and can manage other technical expertise (lighting, equipment installation) throughout the project life-cycle. We do so while staying consistent with all industry standards from SMPTE, NAB, and BICSI.

UPPER: Typical data center.
LOWER: Continuum Headquarters. Architect: Howeler + Yoon. Photo: © John Horner.

Case Studies

Indiana University, Franklin Hall Media School

Bloomington, IN
Architect: Gund Partnership (with VPS Architecture)

When designing a facility intended to usher students into the world of media production, one needs the most state-of-the-art, flexible spaces to prepare them for such a fast-paced, technology-driven career. From active learning classrooms to video production suites to a re-configurable film studio, the IU Bloomington media school will certainly produce graduates with extensive knowledge of what creates and drives 21st century information distribution. One key consideration throughout this project centered around the blending of two worlds: the high tech needs of this educational program and the historic integrity of the building itself. **Quieter classrooms, robust sound isolation for film studios and editing suites, and reverberation control in a multi-story atrium** were all integral to keeping this new facility as flexible as possible. Now with access to state-of-the-art tools and an ideal space to use them, students at Indiana University can look forward to learning about media in an environment as fast-paced as the industry itself.

Photo: © Sam Fentress

Syracuse University, Newhouse School of Public Communications

Syracuse, NY
Architect: Gensler

Syracuse University's Newhouse Studio and Innovation Center is a cutting-edge facility that truly enhances the school's internationally esteemed media program. Unveiled by none other than THE Oprah Winfrey, the complex provides students with a **state-of-the-art television studio, production control room, voice-over booths, an audio room, a newsroom, classroom spaces, and associated support spaces.** Gensler recognized that such innovation didn't stop at a beautiful building. The design firm hired Acentech to craft an acoustical plan to enhance the broadcast and control booth studios, and nearby learning spaces. Acentech focused on the mechanical systems servicing the school's most important television studios. Much of the ductwork had to pass through small preexisting holes within the structure, which had the potential to generate additional noise. Acentech delivered a successful acoustical design on time and under budget. More than two-years of design, construction, and collaboration resulted in a beautiful broadcast facility that looks and **sounds** great, adding to the Syracuse University's already sterling reputation.

Photo: © Robert Benson

Case Studies

Bentley University, Bentley Arena

Waltham, MA
Architect: Architectural Resources Cambridge (ARC)

This new 76,000 square foot, multi-purpose arena, designed by Architectural Resources Cambridge (ARC), is not only home to sporting events, but it is also the host to a variety of functions including, concerts, alumni events, and career fairs. Acentech provided acoustical design guidance and designed the audiovisual system to **ensure clear and intelligible sound for every hockey game, acapella competition, and commencement address.** Clear sound was a particular interest of the athletic director, so that all spectators and participants catch every important call of a referee, the final announcement from the emcee, or the congratulatory remarks of the president. The new arena doubles as an academic tool, providing students majoring in Sustainability Sciences the ability to analyze the facilities energy data. The facility earned LEED Platinum Certification by U.S. Green Building Council, and was named the most environmentally sustainable arena in the United States.

Photo: © Warren Patterson

Sacred Heart University, WSHU Radio/Public Safety Building

Fairfield, CT
Architect: Spagnolo Gisness & Associates, Inc.

Sacred Heart University recently completed a state-of-the-art communications building to house the university's public safety department and the WSHU Public Radio Group. The WSHU spaces, home to CT NPR public radio, include **two full studios, four editing suites, and a large community room/ performance studio**. Acentech's acoustics consultants provided advice and recommendations for the entire building, with special emphasis on the public safety command center conference room, WSHU studios, control rooms, the community room, and associated support spaces. Our AV system design consultants ensured the **integration of audiovisual systems for the public safety spaces, as well as WSHU's broadcast suites.** Acentech's IT Infrastructure and security consultants designed a robust Gigabit structured cabling system to support smart building technology, and a network-based security management system for the access control, video surveillance and emergency communications.

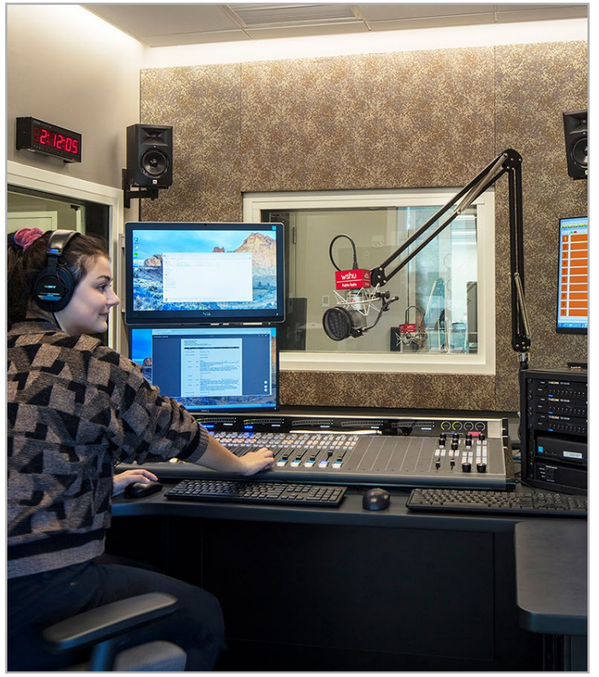


Photo: © SGA

Broadcast Technology Over Time...

1926 | John Logie Baird invents mechanical television.

1927 | Philo Farnsworth creates image dissecting tube. RCA purchases patent in 1939.

1928 | Felix the Cat (statue) helps early broadcasters test this new technology.

1939 | U.S. begins regular TV broadcasts with World's Fair, via NBC mobile camera trucks.

1945 | Television sets gain popularity in U.S. after WWII.

1947 | Meet the Press debuts on NBC, with host Martha Roundtree.

1950 | Zenith debuts 'Lazy Bones,' the first TV remote.

1954 | Westinghouse launches first color TV — with 15" screen.

1962 | Telstar 1 TV satellite launched from Cape Canaveral.

1976 | Sony launches the first Betamax video recorder.

1998 | First High Definition (HD) TVs available to U.S. market.

2009 | Digital TV becomes the standard, replacing older analog technology.

Early Victor gramophone recording sessions, circa 1920.

WFIL (Philadelphia) control room, circa 1961. Photo: © Broadcast Pioneers of Philadelphia.

Testing lighting and AV equipment at Syracuse University's Newhouse School of Communications. Photo: © Robert Benson

When the past joins the present: a Syracuse University student learns about broadcast history through an interactive kiosk. Photo: © Robert Benson

ACENTECH's Experience with

Broadcast, Production + Recording Facilities

- **athena**health
  Corporate Studio
  Watertown, MA
- Berklee College of Music
  Internet Radio Station
  Boston, MA
- Eastman School of Music
  Recording Facility
  Rochester, NY
- Eight-Track Studios
  Recording Studio
  Chicago, IL
- ESPN
  Newsroom Acoustics
  Bristol, CT
- Fairfield University
  Radio Station
  Fairfield, CT
- Gateway Center
  McCann-Erickson Studio
  Chicago, IL
- George Washington University
  Communications Center
  Washington, DC
- The Hartford Group
  TV Production Studio
  Hartford, CT
- Hasbro
  Cake Mix Studio
  Pawtucket, RI
- Harvard Business School
  Klarman Studios
  Allston, MA
- Harvard Graduate School of Education
  iLab and Video Capture Studio
  Cambridge, MA
- Icast
  Studio Spaces
  Reading, MA
- Illinois Institute of Technology
  Language Lab Recording Studio
  Chicago, IL
- ITV
  New Video Recording Suite
  Beverly, MA
- Intermedia
  Sound Studios
  Boston, MA
- Knights of Columbus Headquarters
  Studio and Lecture Hall
  New Haven, CT
- KTCA/KTCI
  Studio, Offices, and Telecenter
  St. Paul, MN
- Lake Michigan College
  TV Studio
  Benton Harbor, MI
- Liberty Mutual
  TV Studio
  Boston, MA
- Merrill Lynch
  Broadcast Suite
  Philadelphia, PA
- Minneapolis Institute of the Arts
  TV Studio
  Minneapolis, MN
- NBC Today Show
  Olympic Broadcast Pavilion
  Athens, Greece
- NBCUniversal
  Regional HQ & Broadcast Studios
  Needham, MA
- The Naval Yard
  Film and Television Sound Stage
  Philadelphia, PA
- Philadelphia Film Society
  3rd Street Film House
  Philadelphia, PA
- Princeton University
  Lewis Science Library Production Suite
  Princeton, NJ
- Ravinia Festival
  Television Studio
  Highland Park, IL
- Sacred Heart University
  Communications Building, WSHU/NPR Station
  Fairfield, CT
- Sound Mirror
  Recording Studio and Surround Studio
  Boston, MA
- Suffolk University
  NESN Studios
  Boston, MA
- Symphony Hall
  Sound Recording and Control Room
  Boston, MA
- Syracuse University
  Newhouse II Production Studios
  Syracuse, NY
- Unispace
  Slate Magazine Podcast Studios
  New York, NY
- University of North Carolina
  Center for Public Television
  Chapel Hill, NC
- University of Southern Indiana
  TV and Radio Studios
  Evansville, IN
- WCCO-TV
  Studios and Newsrooms
  Minneapolis, MN
- WCVB-TV Boston
  TV/Broadcast Studios
  Boston, MA
- WHYY
  Production Studio
  Philadelphia, PA

Media Production Glossary

COMM Production communications systems use to give instructions to camera operators, engineers, production staff, technical directors.

Cyclorama Soft or hard background, green or blue which is used for electronically "keying" in a virtual background image.

Control Room A dedicated space for operators of video and audio production equipment. Typically in this space are special desks, monitors, video switchers, audio mixers, speaker, intercom, graphics computers, servers, and hardware to convert video to IP streams.

Countdown Clock A digital clock mounted on a studio and control room camera for counting in a take.

IFB Interruptible Foldback. Allows one-way communications to the talent on the set.

Lighting LED (light emitting diode) and phosphor lamps used to light a scene in film or TV in a production studio set. [Warm lights have a lower color temperature, cool lights have a high (leaning toward blue) color temperature.] There are many varieties of lights:

- Cyclorama
- Fixed Spot Light (long throw light source)
- Fresnel (provides a large "wash" of light)
- Par
- Soft Lights
- Studio Panels
- Tuneable Phospher Panels

Master Clock A synchronized clock system for the studio, Time code is generated by a NTP server which receives clock information from GPS.

Podcast Podcasting studios are typically small, oriented more toward radio/audio and educational production**.**

Rigging Hardware to support lighting instruments, monitors, props, sets, hoists. Example: Lighting Grid.

Studio A dedicated space for the production of media content, including sound; or cinematic film production.

Indiana University, Franklin Hall Media School. Photo: © Sam Fentress

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