



Architectural Acoustics & Audio/Visual Systems

Engineering ♦ Design ♦ Conception ♦ Integration

Newsletter, Winter 2005

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R & D Industries, Inc. ♦ 812 10th Street ♦ Milford, IA 51351



“This year signifies an exciting milestone for our staff at R & D Industries. In celebrating 20 years of success, we continue to pride ourselves in assisting churches throughout the Midwest with achieving their own goals through the implementation of high-end sound, lighting and video systems. Our vision has not wavered since our first day of business. By utilizing experience, technology, and an in-depth knowledge of sound, lighting and video engineering practices, we continue to provide our clients with the finest state-of-the-art solutions available. I invite you to browse through the information contained in this newsletter and contact us for all of your acoustical, audio/video, and lighting needs. You will find our staff courteous, our prices competitive, and our expertise second to none.”

— Mike Clark, Senior Systems Engineer / Division Manager

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R & D Industries News

RDI Observes 20 Years of Quality Service

What began as a modest technology company in 1984 quickly emerged as a Midwest leader in sound reinforcement and acoustics. Hundreds of churches in the Midwest have benefited from the unmatched expertise and workmanship provided by the staff at R & D Industries, Inc.

The past two decades have included a number of professional highlights for the founders and staff at R & D Industries:

- **INSTRUCTION:** RDI staff has instructed other professionals at numerous conferences such as Syn-Aud-Con, the nation's premier audio and acoustics education group. On many different occasions, our staff has also been selected to provide technical training for members of the American Institute of Architects.
- **CERTIFICATIONS:** RDI employs two of a limited number of professionals nationally who have attained certification from the National Institute of Certification in Engineering Technologies (NICET) in the category of Audio Systems.
- **ON THE CUTTING-EDGE:** The RDI staff was one of the first in the nation to utilize advanced computer-aided modeling to provide pre-construction acoustical analysis.

Old-fashioned hard work and an unmatched dedication to our clients have made R & D Industries a success over the last two decades. We look forward to applying this formula of success for yet another 20 years, further establishing RDI as the No. 1 choice for acoustical, sound reinforcement, video and lighting system needs.

RDI Featured in "Church Production Magazine"

Due to the exceptional outcome of a recent project, the acoustical consultants from R & D Industries were featured in the popular national trade publication, "Church Production Magazine."

R & D Industries senior systems engineer Todd Berger was the lead acoustical consultant for the new Community Heights Alliance Church project in Newton, Iowa, and was featured in the article entitled, "Community Heights Expands Church" which highlights the success of the project.

During the project, RDI engineers worked closely with the church's in-house technical staff to control the acoustical outcome of the newly-constructed worship and multipurpose space. The project demonstrated the importance of considering optimal acoustics, as it relates to functionality, when designing or remodeling a facility.

"It's always nice to be recognized for our commitment to provide clients with acoustical and sound reinforcement services that are second-to-none," said Mr. Berger.

Visit Our New Web Site!

Striving to provide clients with the knowledge they need to make the right decisions, R & D Industries unveiled a new, more graphically-pleasing Web site (left).

The site — www.audioengineering.com — includes frequently-updated material such as recent news, project photos with descriptions, downloadable literature, as well as service and project information. We urge you to visit us online today.



Project Spotlight

St. Paul's Lutheran Church Fort Dodge, Iowa

After fire destroyed their church of over 100 years, the congregation at St. Paul's Lutheran Church in Fort Dodge, Iowa, embarked on the challenge of rebuilding their home.

To coordinate the rebuilding process, the congregation turned to architect Terry Ahlers of Ahlers and Associates. To provide sound, video and acoustical guidance, both the congregation and Ahlers turned to the experts at R & D Industries, Inc.

"We worked through infrastructure planning, which included acoustical consulting, sound reinforcement, technical power, and a dual rear-screen projection system," said RDI engineer Todd Berger. "The congregation's goals were to provide excellent speech intelligibility, capabilities for choral and traditional music, as well as contemporary praise and worship."

To begin the process, the RDI staff performed advanced acoustical modeling of the new worship space before the structure was built. This modeling helped to determine that a Renkus-Heinz "trap-type array" would be the best loud-speaker solution for the church's sound reinforcement system. The use of a Mediamatrix digital signal processor (DSP) would provide for all signal processing within the system, including array steering.

The sound reinforcement system was designed with features that specifically addressed certain functionality needs of St. Paul's congregation. For example, the audio system was equipped with two modes of operation: automatic and manual. In the automatic mode, select microphones can be controlled from a small remote control panel located on the stage, eliminating the need for an operator. For more elaborate uses, the system is switched to manual mode, allowing the operator complete control over all functions.

The audio/video system was also designed to accommodate the needs of a chapel located adjacent to the main sanctuary. The chapel incorporates a movable partition that is shared with the worship space, allowing for independent or combined audio systems.



When the chapel is self-contained, local microphone jacks are provided to the overhead loudspeakers in the area. However, when the partition is opened, the room's audio system works as an extension of the sanctuary and provides time-aligned supplemental loudspeaker coverage to listeners in the chapel.

The system also provides the church with a means to record services via a separate mix for duplication and distribution on compact disk.

Another feature incorporated into the audio system includes the design and installation of a state-of-the-art Carillon system that plays chimes and bells hourly or when programmed to do so. This included mounting loudspeakers inside the 40-foot tall bell tower.

In the design, RDI engineers also provided the ability to send both audio and video to the church's future fellowship hall. This will allow the room to be used as an extension of the sanctuary during overflow situations.

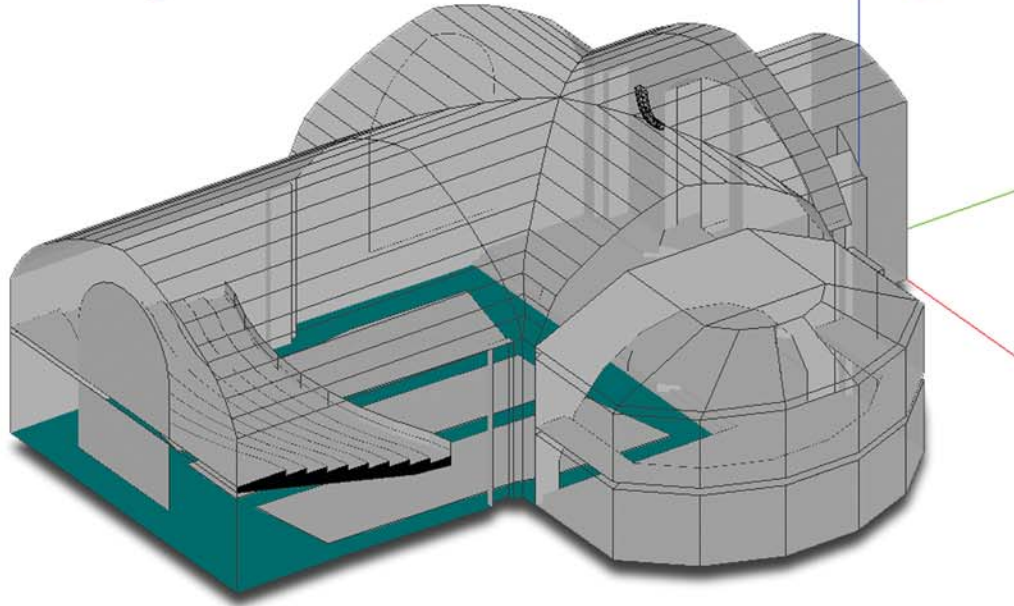
Provisions were also made for future motorized pan-tilt video cameras that will be used for recording, broadcasting live video to the projection system and closed-circuit feeds throughout the building (e.g. nursery).

"When all phases of construction are complete, the audio and video systems may be operated via a custom programmed touchpanel control system," Mr. Berger said. "This will complete the project by truly integrating all systems into a seamlessly-integrated package, greatly simplifying the operation of the entire system."



Computer-Aided Modeling

The EASE model (right) created by R & D Industries engineers is used to predict the acoustical characteristics of a room and to test various speakers and speaker placements. This saves valuable time and money by ensuring the right solution the first time. EASE modeling also allows engineers to “step into” a virtual church (below right) when predicting the acoustical outcome of the sanctuary.



Accurate predictions ensure optimal results

Imagine hearing a sound reinforcement system before it has even been installed. Imagine the ability to compare different professional-grade loudspeaker systems before your church’s final design has been completed. And finally, imagine having the assurance that the sound reinforcement system will function according to your congregation’s needs.

These capabilities and more are provided through a complex computer-aided-modeling system utilized by the engineers and in-house architect at R & D Industries. Our professional staff is equipped with Electro-Acoustical Simulator for Engineers (EASE), an advanced system that allows them to both perform detailed loudspeaker analysis and the capability to accurately predict the acoustical characteristics of a room.

EASE is the world’s first industry-standard acoustical prediction system. Unlike specific manufacturer-based platforms, EASE brings together all the major professional-grade loudspeaker manufacturers into one system, giving our engineers the ability to “virtually” test different loudspeakers and layout combinations in any room. This can be done to existing rooms or those still on the drawing board.

“EASE also provides the ability to do real-time auralization, a complex process that allows clients to ‘sit’ in the virtual model and listen to various loudspeaker or acoustical treatment solutions.” said Mike Clark, senior systems engineer. “This helps to determine system performance prior to construction, ensuring a sound investment for our clients.”

Through EASE, RDI engineers can further determine:

- Direct sound pressure levels
- Total sound pressure levels
- Loudness predictions
- Speech intelligibility predictions
- RASTI speech intelligibility index
- Clarity predictions
- Direct-to-reverberant ratios
- Initial time delay gap
- Much, much more

“Using the information provided by EASE, we can offer advice on different building materials, room geometry and treatments that will optimize the acoustical outcome of a worship space,” said RDI in-house architect Ron Ponec. “With building and remodeling projects, this analysis can be performed during the planning stages, ensuring the project is done right the first time.”

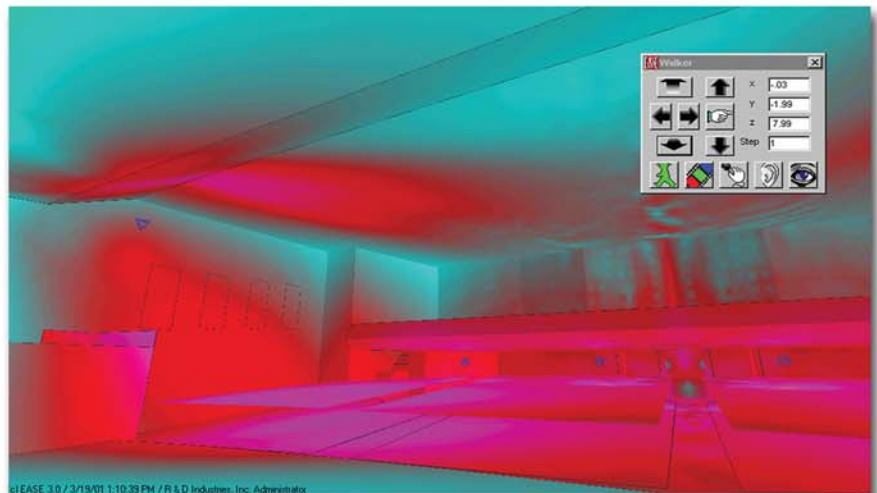
Like any diagnostic tool, EASE is a system that requires training and experience in order to maximize its benefits.

“We have several advanced analyzers that we use for measuring the performance of a

system and others for measuring the acoustical characteristics of a room,” said system engineer David Campbell. “We also have specialized facilities for engineering both acoustical solutions and sound or video systems. Even with all of the tools we have available, the most important piece of the puzzle is the knowledge of how to properly interpret the data these systems provide.”

Mr. Campbell added: “We have an extremely diverse and well-educated staff that includes a licensed architect, certified systems engineers, musicians, and so on. The old adage, ‘A hammer doesn’t make a carpenter,’ is especially true in our industry where too many companies buy a tool or software package and feel they are instantly experts.”

The combined 80-plus years of experience among the RDI staff, especially within a house of worship setting, is the key to maximizing the benefits of this system for our clients.



Performance Lighting Systems

In a house of worship, communication goes beyond simply the spoken word. The powerful message of the church is one of feeling, drama and reflection. Our senses of sight and hearing play a key role in establishing an inspirational setting.

Church leaders understand this, and many are turning to the use of performance lighting systems to enhance the atmosphere of worship within their services.

For 20 years, R & D Industries has designed and implemented performance and architectural lighting systems for both traditional and contemporary worship settings.

A properly-designed lighting system does much more than establish atmosphere and mood. Lighting systems can also help to highlight a point of emphasis for a congregation, as well as enhance video presentation and video recording.

“Performance lighting consists of three basic elements: control, dimming and fixtures,” said senior systems engineer Mike Clark. “Regardless of a congregation’s lighting needs, R & D Industries can implement a user-friendly system to meet their requirements.”

The use of theatrical-type light fixtures within a sanctuary is more common than ever since they offer more control over where light is placed.



User control of these lights can be accomplished at entry stations (e.g. simple push buttons), lighting control consoles (such as the one pictured below), user-friendly touchscreen controllers, and even a specifically-configured desktop computer. From these control stations, operators manage all aspects of a performance lighting system.

Dimming technology minimizes noise issues that once existed with older dimmer systems.

“It is common when designing performance lighting systems to also incorporate house lighting into the design,”

said Todd Berger, systems engineer. “In retrofits, this can minimize the aesthetic impact by possibly utilizing existing fixtures. Not only can this eliminate the need to purchase additional fixtures; it further allows centralized control of both house and performance lighting.”

More elaborate systems can include moving fixtures which allow light to be moved, or “swept”, during a performance. Furthermore, different colors, patterns (gobos), and scenes can be recalled at the touch of a button.

Regardless of your church’s needs, R & D Industries can design a system and integrate it within new or existing facilities. Recent advances have brought an increase in capabilities, yet systems are more affordable than ever. One thing does not change, however: proper design is critical to the success of any electronic system.





The control booth built in the rear of the sanctuary at Westchester Evangelical Free Church in Des Moines (left) is subtle and unobtrusive. Proper planning with an RDI systems consultant before their remodeling project began allowed church leaders to incorporate a state-of-the-art sound reinforcement system into their project without compromising aesthetics.

Space planning for your project's success

When planning for a multipurpose space such as a sanctuary or fellowship hall, thorough audio and video considerations are critical. By evaluating acoustics and sound reinforcement requirements during the planning and design phase of a building project, positive results can be achieved: acoustical problems can be addressed, audio/video system requirements can be incorporated into the design, and a church can save from costly post-construction modifications.

RDI system engineers often provide consulting services for architects and electrical engineers who strive to achieve the most favorable results for their clients. As consultants to these professionals, as well as directly to church clients, we are able to specifically address the following needs:

Control Booth: When designing a building or remodeling project, control booth considerations must be made. Location is critical, with preference given to the same space where the audience or congregation sits. This allows operators to hear the same sounds as the audience hears. It is equally important for the control booth to maintain good sight lines to the speaker or performer. Raising

the booth floor will help accomplish this goal and provide access for wiring to equipment in the booth.

Long-term technology goals within your church should determine the present booth requirements. Therefore, control booths must be large enough to accommodate both current and future audio, video and lighting control equipment.

Conduit Requirements: Modern conduit requirements are much more elaborate than those in the past. With the inclusion of a number of new technologies within modern churches, great care must be taken when designing raceway systems for audio, video and lighting purposes.

Separate conduits must be provided for power and each signal type. For example, microphone cables cannot be run in the same raceway as other signal types such as video, loudspeaker or control cables.

Technical Power: Modern audio/video systems' power requirements are also much different than those of the past. Therefore, technical power considerations should be an integral part of any project's design phase. A/V power systems should remain separate from those of lighting, HVAC, etc., and proper grounding is absolutely essential to prevent

interference from outside sources.

Acoustical Properties:

Rooms within a church — the sanctuary, multipurpose room, etc. — are designed for specific functions. The intended use of the rooms will have a bearing on the desired acoustical characteristics.

While longer reverberation times and early reflections might be acceptable in a multipurpose room, these same characteristics would be detrimental to intelligibility in the sanctuary. Extreme care must be taken in the design of these spaces. **A great sound system cannot overcome the wrong acoustical characteristics!**

Loudspeaker Systems:

Before the advent of computer modeling software, system design was much less accurate. Designers would often choose components based on the fact that they were familiar with or "liked" a particular manufacturer's loudspeaker. This was hardly an approach based on good engineering practices.

Through the use of Electro-Acoustical Simulator for Engineers (EASE) and by properly interpreting the data it gives us, RDI engineers can design a solution for your space. When this is done early in the planning process, the design can provide optimum

performance and allow us to place speakers in aesthetically pleasing locations.

Equipment Space: Modern audio/video systems require a significant amount of space. Therefore, an A/V mechanical room near the sanctuary should be planned to house non-user-adjustable audio and video equipment. Don't plan to use this room for storage. If large enough, the room can also house specialized electrical service panels for the sound and video equipment.

Projection Screens: If your church is planning to incorporate video projection in its worship services, thorough consideration must be given to the placement of equipment. Viewing angles and room shapes must always be taken into account during the planning stages when video systems are designed.

It may be desirable to employ a rear projection system so the projector can be concealed. This type of system requires an entirely different design approach from the conventional front projection system.

Above are *just a few* of many considerations to take into account when designing houses of worship. The experienced engineers at RDI can assist you in making the right decisions for your church.

Technology Spotlights

Eiki Projectors

The staff at R & D Industries, Inc. is pleased to include Eiki digital video projectors in our vast product line. Our choice to partner with Eiki was due to their exceptional product quality, incredible customer support, and a service department that is second to none in the industry.

Eiki offers such services as direct factory support and advanced replacement warranty service. In addition, RDI and Eiki may offer customers loaner units should a customer's projector require factory service.

Eiki has an extensive product line ranging from portable LCD and DLP video projectors, to advanced high-output models designed for digital cinema applications.

Their extensive product line ensures that clients have the best piece of equipment for virtually any application. Eiki also boasts a wide line of accessories including specialty lenses, projector mounts, and control devices, making Eiki a logical choice for any church facility application.

Finally, you will find Eiki's pricing structure very competitive, offering high quality



EIKI

ty products at very reasonable prices. Eiki stands by its products with long-term warranties of at least 3 years.

Eiki (pronounced "A-key") Industrial Company was formed in Japan in 1953 to manufacture and market audio/video equipment.

Today, Eiki distributes and services its digital projectors in the U.S., Canada, and throughout Europe.

Analog Way Scalers

Analog Way is a leading manufacturer of seamless scaling switchers. These units allow users to incorporate a large number of video inputs into a single standard output format.

Most video systems include a large number of input devices which send a specifically formatted signal to the system's video projector (e.g. DVD, VHS, video cameras, and computer formatted signals). While a video projector may provide an input for these types of signals, it typically does not intelligently handle the conversion to the projector's base format.

Analog Way seamless switching scalars effortlessly manage these various types of input sources while eliminating the dreaded

blue screen which occurs when switching sources at the projector. The scaler will convert the signals into one uniform, high-quality signal consistent with the native resolution of the projector. Besides simplification and uniformity, Analog Way scalars offer much more.

With the proper scaler, your church can have professional-looking presentations for its services. Seamless switching allows for smooth transitions with a number of difference effects: fade in/out, wipes, dissolves, etc. It will even allow your church to seamlessly fade into and out of live feeds from an on-site video camera.

Seamless scalars also allow logo insertion. At the touch of a button, a predeter-



ANALOG WAY®

mined image such as your church's logo can be displayed on the video screen between program changes.

Finally, a seamless switching scaler allows for better video system control. This can be accomplished in a number of ways, including via a computer, a wired remote or a control system such as Crestron.

Allen & Heath ML-Series Mixers

The flagship line at Allen & Heath, the ML-Series mixer provides a wealth of features previously only available in consoles costing two to four times more. These features make it the ideal console in a House of Worship setting.

Allen & Heath has developed a worldwide reputation for providing top-of-the-line mixers for use in such settings as concerts, theaters and churches. Their ML-Series mixers were first developed to satisfy customers in search of a console with complete professional features, and they cer-

tainly achieved that goal.

Allen & Heath ML-Series mixers offer a number of key features, including:

- VCA groups
- Matrix options
- Several auxiliary configurations
- Mute groups
- Frame sizes from 24 to 52 channels
- Sweepable equalizers
- Several metering options
- And much more!



ALLEN & HEATH

Even with such a vast array of features, ML-Series mixers are well laid-out, making them simple to operate.

By offering a large selection of mixers for various uses, Allen & Heath remains an ideal choice for churches in search of a high-end solution at a competitive price.

Recent Projects

Church Sound System Installations

Lutheran Church of the Cross	Altoona, IA
Oakwood Road Community Church	Ames, IA
Carmel Reformed Church	Carmel, IA
Westchester Evangelical Free Church	Des Moines, IA
First Lutheran Church	Lafayette, MN
St. Joseph Catholic Church	Milford, IA
Bethel Reformed Church	Sheldon, IA
Dayspring Assembly of God Church	Spencer, IA
Lennox Second Reformed Church	Lennox, SD
First Presbyterian Church	Sioux City, IA
Immanuel Lutheran Church	Livemore, IA
Evangelical Covenant Church	Pomeroy, IA
St. Mary's Catholic Church	Spirit Lake, IA
St. Paul's Lutheran Church	Fort Dodge, IA
United Methodist Church	Perry, IA
Good News Community Church	Okoboji, IA
First Congregational Church	Clear Lake, IA
Holy Spirit Catholic Church	Carroll, IA
Grandview Baptist Church	Estherville, IA
Evangelical Mennonite Brethren Church	Mountain Lake, MN
United Methodist Church	Lake Park, IA
Church of Christ	Alta, IA
Steen Reformed Church	Steen, MN
Second Reformed Church	Lennox, SD
United Methodist Church	Clarion, IA
St. Johns Lutheran Church	Cedar Falls, IA
First Presbyterian Church	Grinnell, IA
United Methodist Church	Oakland, IA
First Presbyterian Church	Newton, IA
First Reformed Church	Rock Rapids, IA

Church Video Systems Installations

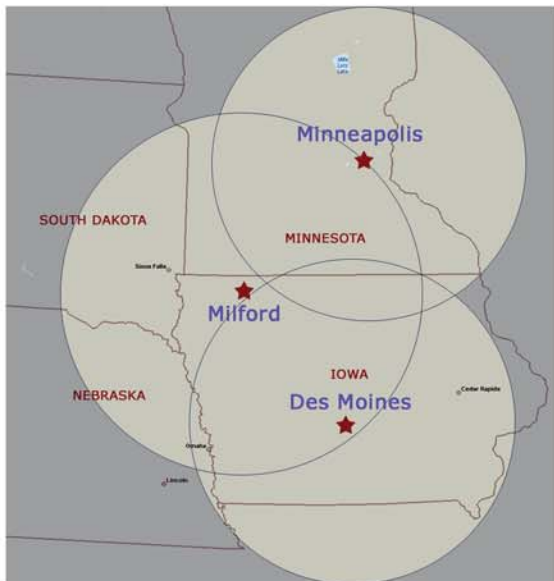
Lutheran Church of the Cross	Altoona, IA
Oakwood Road Community Church	Ames, IA
St. Joseph Catholic Church	Milford, IA
Dayspring Assembly of God Church	Spencer, IA
Evangelical Free Church	Arthur, IA
Hilltop United Methodist Church	Sioux Falls, SD
St. James United Methodist Church	Sioux City, IA
Hope Reformed Church	George, IA
Evangelical Covenant Church	Pomeroy, IA
Fairmont Christian Church	Fairmont, MN
United Methodist Church	Lake Park, IA
United Methodist Church	Sheldon, IA
First Reformed Church	Rock Rapids, IA

School & Commercial Installations

Clay Regional Events Center	Spencer, IA
Estherville-Lincoln School	Estherville, IA
Demoney School	Estherville, IA
West Lyon School	Inwood, IA
Kingsley-Pierson Community Schools	Kingsley, IA
Neuman Catholic School	Mason City, IA
Okoboji Schools	Milford, IA
Polaris Industries	Spirit Lake, IA
Lakes Regional Healthcare	Spirit Lake, IA
Wilton Schools	Wilton, IA
Spalding Catholic Schools	Granville, IA
Worthington Community Schools	Worthington, MN
Holstein Community Schools	Holstein, IA
Colton Community Schools	Colton, SD
Pomeroy Community Schools	Pomeroy, IA
Iowa City Community Schools	Iowa City, IA
Eveready Battery Company	Maryville, MO
Eaton Corporation	Spencer, IA
Hartley Funeral Home	Hartley, IA
Armstrong-Ringsted Community Schools	Armstrong, IA
Redwood Falls Community Center	Redwood Falls, MN
Vermillion Community Schools	Vermillion, SD
Canaries Minor League Baseball Stadium	Sioux Falls, SD

Acoustical Consulting Projects

Oakwood Road Community Church	Ames, IA
Carmel Reformed Church	Carmel, IA
Dayspring Assembly of God Church	Spencer, IA
Dickinson County Courthouse	Spirit Lake, IA
University of Iowa Bowen Auditorium	Iowa City, IA
First Lutheran Church	Milford, IA
Lutheran Church of Hope	West Des Moines, IA
Community Heights Alliance Church	Newton, IA
Wilton Community Schools	Wilton, IA
Iowa State University	Ames, IA
RDG, Dikis, Bussard Architects	Des Moines, IA
Baldwin White Architects	Des Moines, IA
Architecture Inc.	Sioux Falls, SD
Downing Architects	Bettendorf, IA
Bethany Lutheran Church	Emmetsburg, IA
Westchester Evangelical Free Church	Des Moines, IA
Valley Stadium	West Des Moines, IA
Van Meter Community Schools	Van Meter, IA



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