Towards the sound of silence

Unwanted noise is a scourge of modern life. But an extraordinary material from BASF’s research labs is restoring a bit of peace.

Innovative software brings the acoustic absorbing materials that can do the job. BASF has a long history of innovation. The company was set up more than 150 years ago in Mannheim, Germany, to produce chemicals for the dye industry. Today it has annual global sales of €58 billion and employs more than 110,000 people.

BASF’s expertise in sound insulation began with a serendipitous discovery. During the 1979 oil crisis, a team at BASF’s R&D centre in Ludwigshafen began looking for thermal insulators that would cut energy usage. In the process, they discovered a material which turned out to have sound absorbing properties too.

This material is made from the chemicals melamine and formaldehyde which usually react to form a hard plastic. But BASF’s chemists added a “blowing agent” that turns to gas and creates bubbles inside the polymer.

This process usually forms closed spheres of gas within the resulting foam. In this case, BASF’s chemists allowed the bubbles to grow until neighbouring bubbles began to combine. The result was an open cell structure with cavities measuring between 50 and 150 micrometres in diameter, bound by slender polymer strands. The company called this material Basotect® and it has some interesting properties.

As well as being a thermal insulator, it has the remarkable ability to turn sound into heat. The mechanism is simple. Sound waves are better able to enter its open cell structure than a closed cell. Inside the material, the waves set the polymer strands vibrating, heating them up. This heat then radiates away (see diagram).

By contrast, the poor acoustics in offices, sports venues and bars usually result from sound waves reflecting off hard materials such as glass, concrete or metal. Even foams with a closed cell structure reflect a fair bit of sound.

Basotect® is most effective at damping sound waves in the 500Hz to 4,000Hz frequency range — with a wavelength of approximately 70 cm to 10 cm. This corresponds closely to the frequencies of human speech and to the frequencies our hearing is most sensitive to.

Applications are many. Designers and architects have used Basotect® to improve acoustics in sports centres, theatres, restaurants, music studios, hotels and offices. Basotect® helped improve the sound quality in Beijing’s swimming stadium built for the 2008 Olympics. The Solomon R. Guggenheim Museum in New York utilized it to create an immersive installation called PSDA Synthetic Desert III by artist Doug Wheeler where visitors can escape the sounds of the city — it runs until 2 August.

The material is easy to retrofit. BASF has developed a virtual reality audio simulation tool called Envison Mobile that allows users to hear the difference that Basotect® can make in different scenarios. Designers and building managers using the tool wear a virtual reality headset to explore an open plan office, a restaurant, a children’s nursery and a swimming pool with a joystick.

Through headphones they can hear people talking, footsteps, background music and children playing in these virtual environments with and without melamine sound absorbers.

The system was developed by Inreal Technologies, a company in Karlsruhe, Germany, that provides similar systems to large companies. “It allows you to hear the acoustics of a room even years before you build it, allowing for better planning and decision-making,” says Enrico Kürtös, CEO of Inreal.

BASF hopes to eventually provide tailored simulations of the acoustic benefits of Basotect® based on designs provided by individual customers.

Even the best architectural drawings reveal little about the acoustics of a building or room. This can be a big problem if the premises are intended to house a lot of people who want to talk with each other.

That’s why BASF has developed a virtual reality audio simulation tool called Envison Mobile that allows users to hear the difference that Basotect® can make in different scenarios.

Designers and building managers using the tool wear a virtual reality headset to explore an open plan office, a restaurant, a children’s nursery and a swimming pool with a joystick.

Through headphones they can hear people talking, footsteps, background music and children playing in these virtual environments with and without melamine sound absorbers.

The system was developed by Inreal Technologies, a company in Karlsruhe, Germany, that provides similar systems to large companies. “It allows you to hear the acoustics of a room even years before you build it, allowing for better planning and decision-making,” says Enrico Kürtös, CEO of Inreal.

BASF hopes to eventually provide tailored simulations of the acoustic benefits of Basotect® based on designs provided by individual customers.

More at: www.basotect.com

Virtually quiet

Even the best architectural drawings reveal little about the acoustics of a building or room. This can be a big problem if the premises are intended to house a lot of people who want to talk with each other.

That’s why BASF has developed a virtual reality audio simulation tool called Envison Mobile that allows users to hear the difference that Basotect® can make in different scenarios.

Designers and building managers using the tool wear a virtual reality headset to explore an open plan office, a restaurant, a children’s nursery and a swimming pool with a joystick.

Through headphones they can hear people talking, footsteps, background music and children playing in these virtual environments with and without melamine sound absorbers.

The system was developed by Inreal Technologies, a company in Karlsruhe, Germany, that provides similar systems to large companies. “It allows you to hear the acoustics of a room even years before you build it, allowing for better planning and decision-making,” says Enrico Kürtös, CEO of Inreal.

BASF hopes to eventually provide tailored simulations of the acoustic benefits of Basotect® based on designs provided by individual customers.

More at: www.basotect.com