Introduction
Welcome to Building Genius, a podcast from Icynene. Icynene offers a complete portfolio of innovative, high-performance spray foam insulation solutions, which are sold in more than 30 countries around the world.

In this podcast series, we speak to building science experts, and share ideas and advancements in the building industry. We also touch on some interesting projects where spray foam insulation has been used to help address design issues – and other topics of interest to architects and design professionals. We’ll be looking at topics like moisture management, the benefits of continuous insulation, and much more. All from a practical point of view to help architects, design professionals and builders realize their project’s true potential. We hope you enjoy listening.

Moisture management in commercial construction – identifying problems and solutions.

In this episode of the Building Genius podcast, you’ll hear about the importance of moisture management in commercial construction. Our guest, John Broniek, discusses some of the issues that can occur, and how to solve them properly for long-term performance. John is senior engineer with Icynene, and has been involved in improving the energy efficiency and durability of buildings throughout North America since 1990.

Interviewer: John, in regards to the building envelope, can you explain the importance of moisture management in construction?

John: I think the primary focus of the building envelope in any building is to keep the occupants comfortable and separated from the elements. A big part of that is to make sure that we keep the weather outside and not inside. That also means that that building envelope or building enclosure has to be built in such a way that it’s going to last over the long term so that the building's not going to deteriorate, there’s not going to be moisture trapped within that part of the building, and that could eventually lead to problems if that kind of thing happens.

Interviewer: What are some of the common issues or problems that we associate with poor moisture management and how does that affect the performance of the building over time?

John: Some of the problems associated with poor moisture management is there could be in a wood-based envelope, there could be moisture in there that could result in wood rot and possibly mold growth because mold does tend to start up on wood-based products a lot, other building materials, as well. If moisture is within the building, it could deteriorate the construction elements of it. If you do get mold growth, then that would affect the occupants and how they live within their building.

Interviewer: Right. It would affect both the building itself and the people. Do local building codes speak to moisture management? If they do, I’d like to hear about that. If not, why not?
John: Yes, they do to an extent. There are building code requirements based on where the building is located, deal with, for instance, vapor diffusion, movement through the building envelope, which is related to the control of interior moisture, particularly in winter time or cold weather locations hitting cold surface, and controlling that would prevent moisture. There’s also code requirements with regard to basically keeping moisture out, the weather elements out of, let’s say, the wall enclosure. Those exist.

Interviewer: I’m curious what architects commonly specify to address moisture management in the building envelope or the cladding system.

John: I think their primary focus is to specify a cladding system that they feel can provide some moisture protection, whether it’s from bulk water or vapor diffusion. I think their focus usually is to protect the building envelope from bulk water cases and from possible severe wetting events, like hurricanes or storms. That usually leads to the first line of defense for a wall, let’s say, but it’s not always foolproof, particularly in those extreme storms, for instance, where you get a lot of water, and that rainwater, particularly if it’s wind driven, can make its way past a cladding system, so a secondary line of protection is often necessary to protect the balance of the wall.

Interviewer: We’ve all heard about problems like that. Why do current building envelopes or cladding systems fail at providing proper protection against things like that?

John: I think the issue with cladding systems is that they’re not 100% effective against water intrusion. They could be very good in most cases, but there are certain occasions, like storms, hurricanes, tornadoes, that overwhelm potentially the cladding system and too much rain coming in results in the system being overwhelmed and not being able to divert all that rain or keep all that rain outside, for instance, so some of it does get in. Some materials also have their limitations physically in terms of how they’re able to keep out moisture. For instance, brick and stone systems, which are held together essentially with mortar, moisture can go through them. Water can go through them just inherently because of the way they’re constructed and because of their physical properties.

They do have some limitations within them, and they’re usually designed in to make sure that the water that gets past the brick system, for instance, makes its way back out.

Interviewer: John, you covered some of the issues of what could happen when moisture management is, when moisture isn't managed, I guess I should say. I'd love for you to talk about how spray foam insulation can help with moisture management.

John: Spray foam, particularly and really only the medium-density closed-cell product out there, can be used as an exterior continuous insulation and because that family of products can act as a water-resistant barrier, and therefore when water hits its surface, it can drain down, and then at the bottom of the wall surface, it can be evacuated out of the wall to the exterior. It’s an excellent choice as a secondary layer of protection against the weather elements. It also provides an air barrier. Again, the
cladding may not provide that level of protection against all air coming from outside.

So, the foam can provide that air barrier system and basically keep moist air from entering into the wall system and eventually into the building. That's very important. In some climates, it's important to keep that moist air that is very warm from coming into the building and hitting cold surfaces on the inside because that could result in condensation. The vapor barrier or vapor retarder aspects of the spray foam are important in that aspect, as well. Again, I'm just referring to medium-density closed-cell spray foam in this kind of application. It's the only family of products that can be used as exterior continuous insulation.

Interviewer: I'm trying to visualize how this type of foam is installed and the way the product itself and the installation of it insures better moisture management. Can you help us visualize that?

John: Sure. Picture a wall. Let's think of a concrete block wall. We're on the exterior of it. There would be some attachments or brick ties already installed in it, ready for the brick layer. That is when the spray foam insulation would be applied against that concrete wall. Typically, it would be sprayed in thicknesses of 1, 2, or possibly 3 inches. It's a sprayed process that continually happens along the wall, so there are no seams, no joints. We basically get a layer or a blanket of this insulation, which acts as an air barrier, obviously acts as an insulation, but it also acts as a water-resistive barrier and possibly, depending on the thickness, as a vapor barrier, as well. It's a thick blanket, if you will, that surrounds the structural part of the building.

Interviewer: I can see that. In terms of performance, how does spray foam in this wall assembly compare to alternatives?

John: There are other alternatives that can be used on the exterior of the wall system other than spray foam. Probably the most common is a system that consists of foam board products. There are a variety of them that can be used in that. They will require some kind of treatment or some kind of system to make sure that they are continuous in terms of their air barrier and water resistive barrier, particularly, and that may mean having a membrane as part of the system or sealing or taping the joints of the foam boards to provide that water resistance and air resistance aspect. It's more than just one system, which is what you basically get with spray foam.

You're going to typically have the foam board plus another approach or another technique to make sure that you get the insulation, air barrier, and moisture systems all effectively produced.

Interviewer: All right. I imagine if you have a building with an unusual shape, cathedral ceilings or things like that, I would think it's more straightforward to use the spray foam rather than try to accommodate fitting something into a shape that's not a straight line?

John: Yes. Very much so spray foam because it conforms to the shape of the structure it's being placed against. Does really well if that structure is curved or if it's circular or
in any way irregular. It doesn't require extensive cutting or filling and difficult logistics to try and make work, like you would see in foam board products, for instance.

Interviewer: Does cost impact the adoption of this type of technology? People probably think that spray foam is more expensive than others.

John: When you start looking at it from a systems approach and realize that the medium-density spray foam provides the insulation, the air barrier, the water-resistant barrier, and likely the vapor barrier aspects, and then compare to the alternatives, which would consist of a foam board and either labor-intensive joint filling or taping or another membrane product, then you find that the spray foam because it's an all-in-one system is usually much more cost effective.

Interviewer: Aside from moisture management, are there other benefits of using closed-cell spray foam in exterior continuous insulation application, John?

John: Other benefits related to continuous insulation using spray foam lead to the fact that you're going to have a warmer wall, for instance, during the winter months, and that's going to result in greater comfort for people because they're not going to feel those cold spots, and also they're not going to feel those drafts because the spray foam is acting as an air barrier. You're going to have a lot better comfort within the house, and because the wall is better protected from the exterior elements, it's going to be under less long-term temperature and moisture stress, if you will. That should result in greater durability, meaning that it would last longer over its lifetime.

Another aspect, and this relates to the building codes, is that the more continuous exterior insulation that is placed in a wall system in a cold climate means that the greater drying is possible on the inside. In other words, you don't need a vapor barrier on the inside because the condensation aspects of the building code are handled because the first condensing surface is much warmer than it needs to be. I know that's a lot of building science thrown out there, but basically with that thermal blanket on the outside of the wall, then the remaining part of the wall, the interior part of the wall can dry more easily.

Interviewer: Thanks. I've heard that building codes are progressively changing across North America, so the last question I want to ask you is, what do architects need to be wary of and how do they insure that they're going to meet and exceed these new coming changes?

John: I think emphasis now in building codes relates to saving energy, and so you do see a lot more requirements in the codes and even in locations further south where you typically haven't seen this where there is requirements for exterior continuous insulation. How an architect designs this in in order to meet the code requirements is obviously something that most architects, even those that have traditionally not had to deal with this, say in the southern U.S. versus those in the northern U.S. or Canada. I think the challenge for the architects then would be to find the proper system that fits their needs to achieve that goal. I think spray foam is an excellent choice in that regard.
Interviewer: Thanks so much, John.

Thanks for listening. To learn more about Icynene, you can visit our website at http://www.icynene.com/. While at our website, take a minute to subscribe to our “Building Genius Blog.” If you have a specific project in mind, talk to your local Icynene contractor.

To send us a comment about the podcast, please email us at Building.Genius@icynene.com.

Disclaimer
Please note that the views and opinions expressed herein may not necessarily be the views of Icynene. All comments, opinions and views expressed are of a general nature and should not be considered as advice to purchase or to sell mentioned products.