

## Joe Lstiburek Failed So You Don't Have To

Joseph Lstiburek left the University of Toronto with a degree in aerospace engineering, but he had to get his head out of the stars quickly.

"I graduated in 1979 and interest rates were 20%," Lstiburek said. "Nobody was going to hire a punk kid, the only job I could get was as a laborer on a construction site. Carrying shingles, putting the black stuff on the foundation. It turned out that the best thing that ever happened to me was not being able to get a job when I graduated."

As one of the few English speakers on the jobsite, Lstiburek helped read and write the plans and started asking questions. He parlayed this into a career as a custom builder.

Lstiburek began building high end homes, but "nobody was buying," he said.

He was then, "adopted by a bunch of old guys who told him, 'You don't know how to flash a window.'" Window flashing is the key to preventing water intrusion – installed to prevent water from getting into a structure from an angle or joint near windows. Window flashing must be arranged to direct water down and away from the structure. It's part of Lstiburek's mantra, "Don't be a dope, slope; save cash, flash," which highlights two keys to keeping homes safe and dry.

These "old guys" who helped Lstiburek with his early practical building education were the building officials. They taught him the trade and would engage him before he made a mistake. They warned him about potential pitfalls and highlighted possible trouble spots.

Now that Lstiburek, who is a Fellow of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, holds a Ph.D. in building science and is the Principal of the Building Science Corporation, is the expert, he returns the favor to today's building officials. "I've never charged for (building officials) for training because I owe them," Lstiburek said. "They kept me out of trouble and now it's my job to help keep them out of trouble."

This is just the beginning of Lstiburek's philosophy of mentoring. "The more you give away the more it gives back to you," he said. "We give things away and people want to hire us anyway."

Lstiburek said teamwork and humility are essential to success. "Don't be embarrassed to say you can't do it, refer the work to others," he said. "We aren't a threat. We're collaborators." He said a knowledge of science is important to home construction, because "It keeps them from doing stupid things."

"I spend most of my time investigating failures," Lstiburek said. "You learn more from a failure than you do from success. Failure has made me the man I am today."

Today Lstiburek helps others bounce back from their failures.

“Sometimes they (clients) screw up, and I help them fix it and stay out of trouble.” Lstiburek said. “It’s less expensive to fix it than to litigate it.”

Most of his clients are manufacturers and big builders who find it’s cheaper to hire him to stay out of trouble than to hire him after the problems have occurred.

“If you’re dealing with failures, change the way you build.”

Lstiburek noted that today’s materials are a far cry from the “1,000-year-old trees and rocks,” that built yesterday’s homes.

For example, Lstiburek compared using drywall instead of plaster to building with paper, which has a significantly higher drying time when compared to stone. “You’ve dramatically reduced the energy exchange between the inside and outside by using these materials,” said Lstiburek.

Much of his work involves the second law of thermodynamics, “Not all heat energy can be converted into work in a cyclic process. If something gets wet and dries, no problem. Drying is an exchange of energy.”

He said that the combination of increased energy efficiency in homes and more synthetic materials reduced the drying potential of our homes.

“If things get wet, they stay wet longer,” Lstiburek said. “You can’t take the energy efficiency out of the building. If you don’t understand the science, you get into a world of trouble.”

“I listened to the old guys, and they said we had to know the science,” Lstiburek said. “They told me we had to change the way we install the windows.”

“I learned that there are only two kinds of windows: windows that leak and windows that will leak,” he said. “As windows get old, they leak. It’s necessary for them to be able to dry in both directions to handle the incidental water.”

Lstiburek said it’s essential to line every window with a complete flashing. He said he has encountered some pushback to builders who said, “We never had to do that before – we don’t build that way.”

He said the reason it didn’t need to be done before was that building with yesterday’s materials yielded a different result. “If a builder appreciates the science, the builder can innovate,” he said.

Lstiburek said it’s important for everyone in the building industry to know about the science of building. Insurance companies can use this knowledge to manage risk. “People who build well should have lower rates,” Lstiburek said.

Real estate investors can focus their investments in builders, architects and contractors who “aren’t stupid,” and have the knowledge to build leak-free structures. Lstiburek said that commercial construction investment departments of major banks have established building science divisions that review plans before the banks invest to make sure the buildings “stay out of trouble,” and “Protect their investment to make sure they (the building team) don’t do stupid stuff.”

### **“Moisture Elvis”**

Lstiburek did extensive work on the U.S. Gulf Coast Louisiana State University’s extension program, and the LaHouse program under the director, LSU professor Dr. Claudette Reichel. They focused on improving energy efficiency without, “Getting into trouble” (Lstiburek’s phrase for failure of the moisture barrier).

Lstiburek spent significant time consulting with hotels in the region, especially casinos built using the same plans as properties in Las Vegas. Because moisture flows from warm to cold, the hotel’s vinyl wallpaper, combined with the air conditioning in the hot and humid environment was a recipe for disaster.

Lstiburek said since mold doesn’t have an internal digestive system, it “pukes” on the vinyl hotel wallpaper in energy-efficient hotels on the Gulf Coast, resulting in mold-pocked walls. For this discovery, Louisianans christened Lstiburek, “Moisture Elvis.”

After Hurricane Katrina (2005) he toured New Orleans’s Ninth Ward and observed that the houses that survived were built up on stone foundations. The parts that could get wet, got wet. “A building in a hurricane is going to get wet – so design it to dry,” he said. The homes survived because they were able to dry after they got wet.

The houses that were successfully rebuilt after Hurricane Katrina mimicked the techniques used by the homes that survived.

Twelve years later and 400 miles down Interstate 10 in Houston, homes were destroyed during and after Hurricane Harvey because they didn’t use the knowledge gained from the houses that survived Hurricane Katrina when building new homes, Lstiburek said.

On the other hand, “Florida learned a great deal after Hurricane Andrew (1992),” he said. “They kept from buildings from blowing away but not from staying wet.”

They demonstrated that they learned their lesson when three hurricanes hit Orlando in 30 days during the 2004 season, and nobody died, Lstiburek said.

### **Retrofitting and rehabilitating existing buildings**

“When you change the energy balance, you change the durability and the wetting and drying ability of the home,” Lstiburek said.

Lstiburek recommended retrofitting the outside of the building, because retrofitting the inside results in a loss of floor space. He urges caution when retrofitting the existing housing stock because it changes the energy balance of the house.

He especially cautions homeowners to monitor changes they make when following recommendations of health authorities, such as using humidifiers and air filters to get relief from respiratory symptoms and potentially protect themselves from viruses.

“Increasing the relative humidity in the house (with a humidifier) could destroy the home,” Lstiburek said. “And a good filter reduces the airflow – there’s not enough ‘oomf’ from the air conditioning.”

“I know all the things you shouldn’t do because I tried it, and it didn’t work,” Lstiburek said.

### **The Dean**

Although Lstiburek’s work is centered in the U.S. and Canada, his reputation as the “Dean of North American Building Science” has led to projects all over the world.

He has seen thousands of homes fall apart in Oceania because of the changing the energy flow that comes from building with plantation wood instead of forested wood. This engineered wood can’t be treated and isn’t as robust as forested wood.

Lstiburek said Europeans may be victims of their own egos, erroneously thinking that American building techniques aren’t relevant to them, and as a consequence, they haven’t learned relevant lessons that would help them combat their own issues with stucco.

“The difference that the Europeans didn’t understand was that they built out of masonry – three to four layers of brick, and stucco on the outside,” he said. “Their stucco leaks, and the water gets reabsorbed into the brick. There’s no AC (air conditioning) to help the building dry out.”

Lstiburek noted that the more a building weighs, the more expensive it is. “In the US, we went hollow, light and tall before the Europeans,” he said. “The Europeans are now going light and hollow, but they’re not paying attention to the mistakes we (American builders) made, so they’re experiencing the failures we experienced in the 1980s.”

Lstiburek has extensive experience in Europe working on projects for the U.S. military. He said that the team uses local architects and contractors for building U.S. bases in Europe.

He said they end up imposing American design standards, but he takes time to learn the local practices as well. He reviews the architectural plans and teaches the local team about the building practices that will help them “keep out of trouble.”

Lstiburek said that Europeans are about two decades behind the U.S. in understanding how high-performance buildings work. He thinks Americans are better than Canadians at managing the flow of energy from the inside to the outside of the home.

“The U.S. has air conditioning and heating – we get whacked both ways,” said Lstiburek.

“Europeans don’t understand air conditioning and humidity,” said Lstiburek. “They’re not quite ready to admit what they don’t know. I want them to learn from our dumb things, so they can do new dumb things.”

“People in the U.S. don’t appreciate how sophisticated home building is,” Lstiburek said. “It’s not appreciated by Americans.”

When it comes to retrofitting and rehabbing, Lstiburek said that Americans have a lot to learn from other countries. “The Brits and the Quebecois know more about old buildings than anybody else,” he said. The U.K. and Canada have a lot of older homes in their inventory. He recommends looking at the building practices in Montreal, Halifax and Wales.

Lstiburek attributes the U.S.’s relative success with building science to its climate diversity and mix of buildings. “We have everything from Fairbanks, Alaska to Miami, Florida – hot and humid to arctic and even sub arctic,” he said. “Because we have everything, we’ve had to learn fast and that’s what make America so special.”

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Above all, Lstiburek said he’s, “trying to keep our fellow people out of trouble,” he said. “I know about stupid stuff because I did it before everyone else did.”

NAHB’s Global Opportunities Board awarded Lstiburek the Global Innovation Award for Research and Global in 2022. He will join members for [Shop Talk: Building Techniques: Avoiding Leaks](#) on **Tuesday, May 24 from 2-3 pm ET**.