

BY JOHN VASTYAN

AMISH BARN IS TRANSFORMED INTO A RADIANTLY HEATED HOME

**Hydronic radiant heating and geothermal cooling turn
an old barn into a homestead.**

Recently, Chris and Michelle Simon hired an Amish homebuilder to help them turn a big ol' barn into an ultra-comfortable home.

For many years, the barn – built in 1871 – served the needs of Amish farmers. A herd of milk cows, draft horses and mules for work, smaller horses for buggy transportation, and an assortment of sheep, goats and chickens all shared the space.

But the Simons saw something else in the old building: a home for their family.

A Rocky Start

For years, the previous owner had tried to convert the barn into a home but was not successful.

When the Simons initiated the project, their general contractor, and with him a subcontractor – with

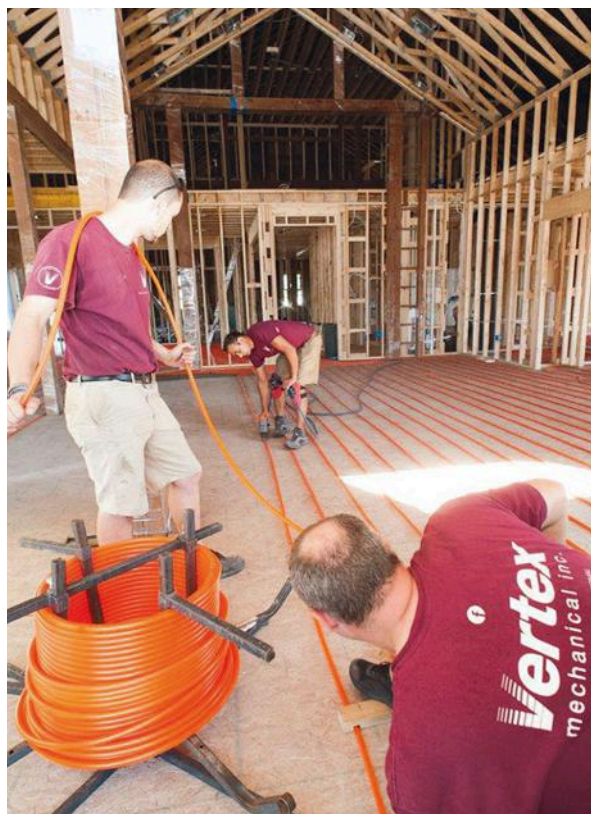


The Simon barn home in Mt. Joy, Pennsylvania, was a labor of love and today provides the essence of rustic luxury, complete with hidden radiant heat comfort.

an HVAC solution initially planned around forced air – bailed.

After several interviews, the Simons opted to go with a friend's referral as project GC, Amish man Mike Miller. Miller was quick to point out that the old post-and-beam barn, because of its unusually large size – 60 by 100 ft. – had some structural oddities.

At each end, inside, there were mysterious, inside-out



From left to right: Vertex's Schweitzer, Khadka and Youndt attach Watts Radiant PEX+ tubing in the home's great room.

flying buttress-type beams, connecting queen post wall trusses to floor supports. The “strong back supports” were required long ago because of the strength limitations of the timbers used for structural support.

Miller also noticed that the barn's previous owner had radiant tubing installed in the barn's lower level slab. So



From left to right: Ryan Schweitzer, associate technician, Vince Youndt, president, and Man Khadka, Vertex Mechanical, install ½-inch Watts Radiant PEX+ tubing (walls were double-plated prior to the pour).

he asked the Simons, “Why not use radiant heat upstairs, too?”

“We assumed wrongly that radiant heat required a heavy concrete slab. We later learned that it would be possible to have radiant heat in the upper floor, too,” says Michelle Simon.

Which brings us back to the Simons' key challenge: How could they make the barn truly comfortable for



The barn home nears completion.

themselves, two at-home sons Tyler and Evan, and daughter Hannah, in her second year at college?

Enter Vertex Mechanical

The Simons learned from Vince Youndt, president of Stevens, Pennsylvania-based Vertex Mechanical, that they could have radiant heat upstairs by encasing radiant tubing within a poured, two-inch gypcrete layer.



Ryan Schweitzer makes PEX connections to a radiant manifold in the home's lower level.

As a two-time RPA design award-winner, Youndt knows a thing or two about radiant heat.

Youndt and his team, chosen by the Simons to provide HVAC solutions there, devised a plan to install hydronic radiant heating and geothermal cooling for most of the lower floor, and the 4,900 sq. ft. of living space above it.

By mid-2017, Vertex pros were installing Watts Radiant PEX+ tubing to the upstairs OSB subfloor, attached to massive floorboards.

Comfort Solutions

"We use a lot of Watts Radiant tubing and also like their stainless-steel manifolds because of the flexibility they provide in adjusting flow if needed," says Youndt.

Youndt's heat load calculation for



Jared Fox, Vertex lead installer, makes final connections in a central tekmar controller.

the Simon's home came to 128,000 BTUs for space heating and domestic water.

First in line for space heating is a five-ton water-to-water heat pump. Youndt then selected a 150 MBH Laars Mascot LX wall-hung, mod-con, heat-only boiler to meet mid-winter supplemental heat needs. The boiler injects heat into a buffer tank when ambient temps trump the geo. Packed with features, the made-in-America LX includes an easy-to-use

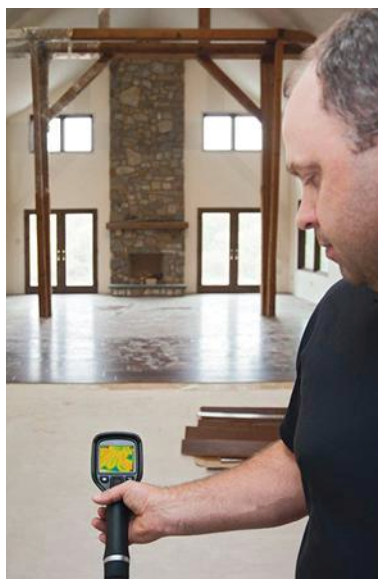
control system, outdoor reset, prime-less condensate trap, zero clearance installation and venting up to 150 ft.

The Simon family's domestic water heating needs are met by a Bradford White 60-gallon indirect, and 40-gallon water heater. The 60-gallon unit receives heat from the boiler; the smaller water heater is tied to the larger geo system's desuperheater, which uses waste heat to temper the tank before entering the cold side of the water heater. This provides a 60 percent energy savings for domestic water heating. A third Bradford White unit, a 40-gallon indirect, serves as the geothermal water-to-water buffer tank.

"The Bradford White systems have big, high-flow stainless steel coils inside, ideal for quick heat transfer and recovery," explains Youndt. "But their biggest attribute is that we've used them exclusively for decades with no disappointment. If my guys need a water heater or indirect – there's no choice in the matter. And we've never regretted it."

Meanwhile, Vertex's drilling subcontractor drilled four, 300-ft. vertical boreholes to meet the need for eight tons of geothermal cooling.

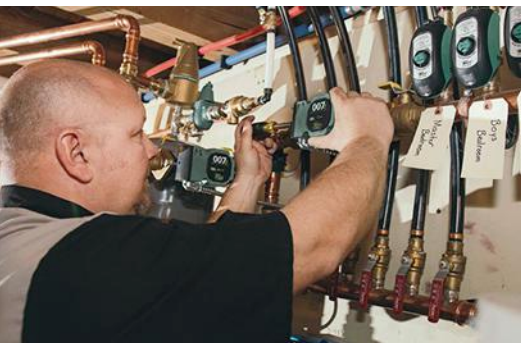
There are eight comfort zones in the home, all controlled by Taco Zone Sentry zone valves, each tied to a Taco zone control. Another key component is a Taco 4900 air separator. "In my opinion, their zone valves



Vince Youndt, president of Vertex Mechanical, takes floor temps with a thermal imaging camera after system start-up.

and air seps are the best available,” according to Youndt. Also included are a Watts 911 combination fill and backflow preventer and Extrol expansion tanks.

“We also chose four of Taco’s newest, ECM-powered 007e system circulators, each tied to a tekmar 406 control,” says Youndt. “The circs are super-efficient, a perfect partner to zone valve-controlled hydronic zones, and offer two key advantages over other ECM circs in this size:



Doug Zerbe, Vertex Mechanical technical manager, wires one of the Taco 007e circulators.

Taco’s ‘BIO Barrier’ protects the pump from contaminants, and its ‘SureStart’ function automatically frees locked rotor conditions and self-purges air.

“We chose tekmar for our control strategy,” continues Youndt. “The



Enjoying a break in the Simon’s mechanical room are Vertex Mechanical pros Man Khadka, Jared Fox and Vince Youndt.

system was easy to install, easy to program, and offers ideal functionality. We also installed the tekmar 485 to give the Simons remote access to the home’s climate control. “

Radiant: Surreal Experience

Just weeks after the project was completed, winter threw a fastball, with two weeks of record low temps and high winds.

At the end of 2016, the Simons received their certificate of occupancy. Christmas that year was one they’ll never forget. Twelve months later, they eagerly welcomed guests during a Christmas home tour.



The unusual, heavy timber “strong back supports” strengthen each end of the long structure.

For the Simons, there’s no easy way to describe the feeling they get while standing at one of the big windows, in bare feet.

Inches away, a winter storm “seemed surreal” in Michelle Simon’s words. “Like it was happening on a TV screen, not just on the other side of a window.”

Ahhh: the surreal comfort of radiant heat.



Chris and Michelle Simon enjoy a break together in the completed home.

John Vastyan, owner of Common Ground, a Manheim, Pennsylvania, trade communications firm, is a contributor to Radiant Living.