

GREEN TECH THE SERIES COLUMN FOR APRIL 20, 2016
HEADLINE: RADIANT & MINI-SPLIT; A PREMIER HVAC SYSTEM

There has been a recent upsurge in interest for alternative heating sources in both new and renovated homes. Much of this is due to the lack of efficiency of forced air ducted systems - specifically the duct work, unless it's professionally sealed. As well, there is the requirement for considerable space for, not only the ducting, but for the heating appliance, usually a furnace. As homes get smaller, and the trend is such, then some rethinking of how we heat and cool our homes has entered the equation.

I often smile when the conversation comes around to radiant heat and how it is thought of as a "new" technology when, in fact, it dates to ancient times. The Romans warmed rooms by running flues, tended by slaves, using wood burning fires. These fires operated under elevated floors usually covered in marble. Wood and coal fired boilers supplied hot water to thousands of homes with the early cast iron radiators. It's documented that renowned architect Frank Lloyd Wright first used copper lines buried in concrete for his Usonian era homes in the 30's. These homes were small, single storey residences, without a garage and limited in storage, not unlike the tiny home movement today. One US subdivision built after WW2 also tried similar heating methods. The catch, of course, is that the copper eventually corroded and the system failed. The advent of hydronic grade PEX tubing has eliminated this issue, making radiant heated floors more affordable.

With the advent of PEX, in-floor radiant heating has grown dramatically. The benefits are obvious. You walk on the heat making you and your home warmer. Homes with radiant heat are often kept at 2-3 degrees cooler than a forced air home. With the rise in allergies today, air borne pollutants simply don't happen, since you are not blowing dust around. Forced air systems are prone to cool spots, radiant heating reduces drafts. Along with the obvious efficiency, you can zone a number of areas or rooms, making the system comfortable in the rooms where you sleep, for example. Today, an in-floor radiant heated home is considered a premium system and will substantially add to the resale value of your home. Lastly it is quiet, no whistles from the ducting or noise from the furnace.

I have been asked whether this is only applicable when you design a new home and whether it is possible with a two story home. While imbedding in a concrete pad certainly adds the thermal mass effect, by no means is it the only way to

install radiant floor heating. There are numerous options. They range from attaching the PEX under the sub floor by means of a reflective metal shield to actual sub floors where the groove for the piping is pre-slotted to imbed the pipe. As well, there are plastic mats that can be attached to the floor that allow various floor patterns of pipe to be laid within this matt. All of these can be used in a major renovation, including where there is a second level. There are lightweight concretes on the market today that, provided the framework of the home is suitable, can be poured over the pipes. Most of these concretes are self-leveling, which can be a nice bonus in an older home or a floor that is uneven.

I have also heard the argument that this type of in-floor heating leaks. In all of the thermal camera tests I have done looking for leaks in concrete imbedded radiant flooring, in every case it was something that was done after the installation. A hole drilled in the floor for some reason, done by someone who was not careful or a defect in the pad that caused extreme movement that caused the issue. While a high percentage are water provided, you can use a glycol solution which freezes at a lower temperature. The concentration of glycol dictates the freezing point.

Another question pertains to the type of flooring. Many people think that a radiant heated home has to be porcelain or stone tile. While I don't recommend real wood, the architectural/engineered wood flooring available today is almost impossible to tell from solid wood and it handles the heat transfer with little or no issues with respect to shrinkage or drying out. My only suggestion is to stay away from carpet. It's simply a poor covering with respect to heat transfer. In a smaller renovation situation, you can install electric radiant floor mats under tiles and this is done in bathrooms and some entrances. I would question the install and operational cost here for a whole home, especially if the home has a small main electrical entrance.

The last argument is that a radiant home does not have ductwork to an air conditioning system. This was a major stumbling block for years; today, not so. The development of mini-split systems has taken away that argument. Popular in Europe, they are now available in North America and they offer an efficient, cost effective answer to air conditioning a radiant heated home. In fact, when I did the calculations for our church, (www.alltechgreenchurch.ca) I found a mini-split was more functional than a conventional unit. You can buy these systems with more than one actual room unit. I know of one make that has four wall modules all running off the same external compressor. With the popularity of open concept floor plans, most single storey homes manage with two mini-split wall units. The

added plus here is that some makes are actually heat pumps, as well. It's no secret that radiant heat, while comfortable, takes some time to get to a higher temperature. In a situation where the fall or spring temperatures take quick drop, these units offer a faster heat source.

This blend of systems is not inexpensive, but if you are planning on staying in your home for some time, the sheer comfort and energy savings is well worth the cost.

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