

## **The Kinzer Home; Issaquah WA (2007-present) 12,000 Square Feet.**

### **Project Scope & Challenges:**

#### **Radiant Floor Heating:**

Because of the expensive woodwork, Brazilian wood floors, and hand carved Italian tiles the Radiant Floor Heating system had 3 major challenges to overcome. First, the wood floors had to be protected from rapid expansion and contraction from being heated, and the floors also had maximum heating limits that wouldn't allow the house to be heated by Radiant Floor Panels alone. Second, the extensive millwork would require proper humidification during the winter. Last, the floors had a maximum surface temperature requirement of 80 degrees.

To overcome these challenges we chose to install Warmboard® Radiant Structural Subfloor Product. Warmboard® is a subfloor product that has a layer of aluminum and the radiant tubing patterns routed into the profile of the product. We have worked with the product many times but not quite at this home's scale. Because of the aluminum layer, the heat transfer was much more uniform resulting in an even heat distribution across the surface of the finished floor. Without hot and cold spots in the floor we had a much more useful heating surface area which yields more heat at the 80 degree limit of the wood floor.

To overcome the need for a second stage of heat and the need to maintain proper humidity levels throughout the home we chose to install hot water heating coils in the air conditioning ductwork. We enabled it to be on demand for a quick heat boost. We also installed a steam humidifier in the ducting for humidity control.

#### **Air conditioning:**

Because of the extensive millwork and the obtrusive nature of ductwork we needed a way to "hide" the supply and return registers from sight. Not an easy task because the average supply duct is 6x12", and the average return duct register can be over 30x30". To solve this issue we decided to install a high velocity air conditioning system that utilizes very small ducts with 3" registers. However, velocity equals more noise so we had another issue to solve, "how do we keep the velocity noise down." The only way to change the velocity of any single supply register is to install more supply registers. So we met with the interior designer and architect and managed to figure out a way to install twice as many registers in every room and disguise the registers as millwork. As a result we have a system that outperforms conventional AC systems and is undetectable.

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**Controlling the system:**

We had a total of (4) Air Conditioning zones and (25) Radiant Heating zones plus (4) 2<sup>nd</sup> stage emergency heating zones. Can you say “wall acne?” Imagine that many thermostats on the walls in addition to humidistats, smoke detectors, whole house controls, light switches, and fire sprinklers. Not pretty, and certainly not a place to showcase artwork. To solve this problem we decided to probe the ability of the whole house control to take on the entire HVAC system. We found out that the system had an ability to control a total of 6 thermostats and one humidistat. However, because the system was software based they were able to make some additional accommodations at our request. As a result, the control company (Lagotek) now makes a controller that integrates with the client’s audio, visual and lighting. It controls our system with invisible temperature sensors hidden in the walls. Now our customer can control their environment along with lighting, security, audio, and visual--all from the same key pad. We currently work with both Lagotek control systems and Crestron control systems, and we are willing to integrate with any system capable of supporting ours. We are licensed electricians with a heavy background in controls so we can speak “nerd” to the A/V people!

**The 21 gallon per minute shower/spa:**

A typical shower runs at 2 ½ gallons per minute. Our clients shower is capable of running at 21 gallons per minute. That is what they wanted! From our standpoint you can’t store enough hot water to give them a good shower without dedicating some real estate to water heaters. So we chose to generate the hot water instantaneously. For this we needed (3) conventional residential boilers and (1) 120 gallon storage tank to act as a buffer. The only problem is that this costs a lot of money to spend on generating hot water. So we talked to the pool engineer and found out he had the exact same heating requirement for the swimming pool. So for ½ an hour a day we programmed the boilers to give heat priority to the shower and then the boilers heat the pool the rest of the time. By doing this we eliminated (3) pool boilers and saved our clients a lot of money!

**The swimming pool:**

A major problem with indoor swimming pools is the humidity level, corrosive nature of the pool chemicals, and indoor air temperature. We actually solved this with one piece of equipment. To dehumidify the pool we chose to take the latent heat out of the air and transfer that heat back into the pool via refrigeration with a hot water heat exchanger. This system also is our cooling system for the room. Because the pool maintains a temperature of 90 degrees it will heat the pool house beyond the indoor comfort level even on the coldest day of the year. Also by maintaining the humidity level we can keep the pool chemicals out of the air stream.

**October, 2008:**

We will soon be installing 15 Viessmann evacuated tube panels that consist of 20 tubes each. This system will be primarily used to heat the pool but will also integrate with the main homes domestic hot water through heat exchange. The hot water produced from the solar collectors can also be used in conjunction with the radiant heat system.

**In conclusion:**

The homeowner interviewed 7 ‘dream home type’ mechanical companies. He chose **Mitchell Mechanical, Inc** after talking with us about our past jobs and our ability to integrate multiple components. He wanted one company to take care of the energy system and controls—not 5 different sub-contractors that can’t communicate. Our client also was really interested in lowering their energy ‘foot print’ and we were able to achieve that for his family. Once the solar hot water is installed (which will be quite simple compared to what has already been achieved) this home will be finished from a heating/cooling standpoint.