In some cases, great projects start with demanding customers. Demanding doesn’t have to mean difficult: It can simply mean customers who know what they want, and are willing to seek out the HVAC contractor who can help them achieve it.

Homeowners David and Laura Grisar knew what they wanted. They were building a new 6,500 sq.ft. home, and the only fuel available was LP gas. The Grisars wanted an energy-efficient HVAC system without sacrificing comfort. They wanted radiant floor heat in the lower level and all first floor tiled areas. They wanted a system that would heat the pool. They wanted fresh air brought to the home, and humidity control so no condensate would form on the windows (this was especially important in a trophy room where numerous game mounts are located). They also were concerned about being green.

In stepped contractor Mark Doll of Professional Geothermal Systems, and the rest, as they say, is Quality Home Comfort Awards history.

The Grisars’ home is a ranch-style “Y” shaped home with a fully exposed lower level. This unusual shape called for three distinct zones on the first floor, with one of those located above a heated garage.

“I enjoy working on custom homes like this that have unique elements to them,” Doll says. “The homeowners wanted a very energy efficient system and had some nice land, so we immediately considered geothermal. When we started talking to them about their real-time savings and the federal tax credits, they were sold on the concept.”

Doll started the design process by performing a Manual J load calculation using Elite Software’s HVAC load program. The load calculation information was then input into Climate Master’s Geo Design program to determine which equipment best suited the loads.

Ultimately, a 5-ton geothermal water-to-water heat pump was selected for the radiant floor heating system. This unit also heats the outdoor pool in the summer. For the home’s...
The trophy room at the Grisar’s home needs tight climate control. 

forced-air system, a 5-ton geothermal water-to-air heat pump was chosen. 

The system has two 5-ton horizontal loop fields that have individual manifolds in the ground. The piping mains from each field enter the mechanical room where they share a manifold in a reverse-return configuration. This essentially makes the loop field a single 10-ton field. This design allows for an even exchange when the water-to-air heat pump is running in cooling mode and the water-to-water unit is running to heat the pool. Flow is optimized with separate pumping controls for each unit. A loop expansion tank allows pressure to increase or decrease in the large loop when the seasons change.

The hydronic side of the system includes a 40-gallon non-pressurized buffer tank. This simplifies the system by combining air elimination, pumps, and controls all in one package. Five of the eight pumps distribute water to five different radiant floor zones via ¾-in. Roth AluLaser piping connected to Roth manifolds with flow meters. Roth ½-in. PEX is poured in the concrete slab, with 2-in. R-10 foam slab insulation on the bottom and ends of the concrete slab. Two more pumps distribute hot water to the first floor tile areas for floor warming using staple-up heat transfer plates. The last pump serves a cupro-nickel pool heat exchanger controlled by a 24V digital temperature control wired in series to a flow switch.

The forced-air side of the system features four zones. The architect and builder designed floor trusses to accommodate all of the ductwork, which is sealed using mastic on all joints and insulated to R-8 in the unconditioned spaces. All of the bathroom exhausts feature Broan UltraSilent exhaust fans with 6-in. ducting. Fresh air ventilation is achieved using a Honeywell TrueFresh energy recovery ventilator. A direct-ducted system pulls air from the house directly from the bathrooms, which provides additional moisture removal from the areas where the moisture originates.

Proper humidity levels are maintained with a Honeywell TrueSteam 12 gph steam humidifier. The hydronic system is controlled with digital thermostats for each zone; the forced-air system uses EWC zone dampers with an electronic bypass damper to control static pressure. This is all tied to Honeywell’s wireless RedLink wireless zoning system. Communicating to the system’s zoning panel are wireless thermostats, with the main first floor thermostat also controlling the humidifier and air-to-air exchanger.

The HVAC system designed and installed by Mark Doll (below) keeps both the home and the pool water comfortable.
The control package features an outdoor air/humidity sensor that can be read from the first floor thermostat, a remote control that allows the homeowners to control the entire house, and an Internet gateway that allows the system to be controlled remotely using a computer or smartphone.

In commissioning the system, Doll balanced every forced air outlet as well as every zone using the minimum and maximum settings on the EWC dampers. Balance for the radiant flooring was achieved by adjusting the flow meters on the manifolds. Heat of rejection/extraction calculations were performed on the heat pumps, and amperage draw readings were obtained on all of the equipment and pumps. Loop water flow was balanced by adjusting the ball valves.

“At Professional Geothermal Systems, we take great pride in providing creative and efficient comfort solutions for our customers. We also take pride in the quality and craftsmanship our company delivers,” Doll says.

He also tipped his cap to his partners in the project, Welton Builders and Harbor City Plumbing, and Mishefski Designworks Studio LLC.

“We’ve worked with Welton many times, and it’s always a pleasure,” Doll says. “They build a very tight home, are dedicated to giving customers what they want, and are very much onboard with geothermal. Harbor City did a nice job...
of integrating their systems with ours, and Mishefski always provides creative and innovative designs. It’s a team effort.”

And as for “demanding” homeowner Dave Grisar? He has nothing but praise for Doll and his company.

“Mark is a total professional. I have two cousins who do HAVC work, and when they came in and took a look at the geothermal system, they were very impressed,” Grisar says. “They said the system was just beautifully done. It’s impressive to hear that from other professionals in the field.

“The equipment is quiet, the temperatures are even, and the comfort is great,” Grisar adds. “We’re really happy with the system. And beyond that, Mark was a breeze to work with. Anytime we had any questions he came out to the house and walked us through it. He was a true professional and made it all very easy for us.”

The work done by Professional Geothermal Systems drew raves from HVAC industry insiders.

PRODUCTS KEY TO SUCCESS
- ClimateMaster 5-ton water-to-water heat pump
- ClimateMaster 5-ton water-to-air heat pump
- B+D Manufacturing 40-gal. nonpressurized buffer tank
- Honeywell TrueFresh energy recovery ventilator
- Honeywell TrueSteam steam humidifier
- Roth PEX Manifolds with flow meters
- Ranco 24V digital temperature control
- Honeywell TrueZone zone control panel
- Honeywell Prestige IAQ thermostat
- Honeywell Internet gateway
- Honeywell personal comfort control
- Honeywell wireless outdoor sensor
- EWC zone dampers
- EWC electronic bypass damper
- Broan UltraSilent bathroom fans
- Roth AluLaser radiant piping

The geothermal heat pump and buffer tank help the system provide quiet, efficient comfort.

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