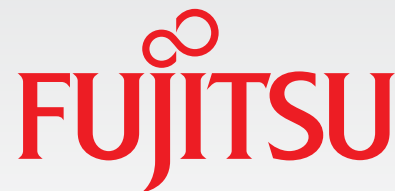




CASE STUDY



PROJECT:

Large residential custom built home

THE TEAM:

MANUFACTURER'S REP:

Wales Darby

DISTBUTOR:

Ferguson Enterprises' VRF division, Secaucus, NJ

CHALLENGE:

Large home size, complex framing and floorplan. Need for extended line set lengths. Three-phase power not available.

SOLUTION:

11-zone VRF system: J-II and J-IIS outdoor units. Low, medium and high-static air handlers. Several vertical ducted condensers. One 18,000 BTU wall-hung unit. SBC100 Controller.

RESULT:

The home is extravagant and ornate, so the HVAC system design was created to minimize the visual presence of all indoor elements.

DESIGN-BUILD CHALLENGES AVERTED

Custom homes can be a double-edged sword for wholesalers supporting design-build contractors.

While working on any complex installation, there's great opportunity to build a lasting relationship with installers by becoming an asset, to install trust in a brand, and raise the installers overall confidence through superior support.

On the flip-side, providing that extra level of support needed to overcome unique obstacles, work around changes that occur during construction, and making sure that the installer understands exactly what the work entails can be difficult at times.

Typically associated with ample budgets, a custom residence can serve as a blank canvas for the installer that enjoys freedom of creativity, focusing on the art of design and the potential for premium comfort. For wholesalers, the same applies, as does the possibility of providing material from a variety of different product lines that might not be required in the average home.

Ferguson Enterprises' VRF division, in Secaucus, NJ, became involved with a system design at 10,000 square-foot, new construction residential project in Paramus. Already well along in the design process, the home featured sweeping stairways, spacious rooms, finished third story spaces and an indoor pool.

"The homeowner wanted in-floor heat, so we knew from the beginning that there would be two independent systems. Three, if you count the natatorium system," said Karol Tomaszewski, VRF sales and technical advisor at Ferguson. "For air conditioning and shoulder-season heat, we supplied several Fujitsu Airstage VRF systems."

FLEXIBILITY IN DESIGN

The home's radiant system is designed as the primary heat source for the bulk of the winter. Two condensing boilers – one on either side of the home – serve more than 20 zones throughout. Gypcrete was used to create a lightweight slab over the tubing on the upper levels of the house. The hydronic system also supplies heat to the natatorium through a hot water coil in the Dectron dehumidification system.



CASE STUDY

The VRF system includes 11 zones to ensure efficient operation, controllability and comfort. Limited access above the ceiling required a very flexible design.

"The size of this home, along with the framing and floorplan, created a unique set of challenges for the installing contractor, who had never used VRF in a residential application," said Tomaszewski. "They sought our help to assist with design."

Beyond the additional considerations needed for a VRF system over mini-splits, there was a need for extended line set lengths, even though ducted evaporators were used extensively.

Three-phase power was not available at the site, so large, V-series Airstage systems weren't an option. Yet the flexibility of serving numerous zones of different sizes across the large home was still needed without

installing condensers all over the home's perimeter.

"We initially looked at the J-II Airstage systems, comparing the line's capabilities to the needs of the home," stated Tomaszewski. "Because the J-II can support a total connected pipe length of 590 feet, two, five-ton systems were needed to accommodate the longest runs."

As the design was refined, Tomaszewski and the Fujitsu Sales Engineer realized that instead of using J-II systems across the entire project, costs could be trimmed by using the new J-IIS models where line set lengths were shorter. The system has a total connected pipe length of 260 feet. As a result, two of these were ordered, at three tons each.

The backyard of the horseshoe-shaped home will include a beautiful courtyard complete with multi-level hardscaping and a grand staircase. To keep this space free of mechanical

equipment, two VRF condensers were installed on either side of the home.

COMFORT AND CONTROL

"Even though the units were installed on opposite sides of the home, some the refrigerant lines are still quite long, continued Tomaszewski. "Using a VRF system gave us the flexibility to provide 11 zones to an intricate blueprint without many condensers. This couldn't have been accomplished with mini-splits or conventional unitary equipment."

Low, medium and high-static air handlers are all used, depending on the space. Several vertical ducted condensers are used in the basement, and the garage is conditioned by an 18,000 BTU wall-hung unit.

There's a total of 28 indoor units. Refrigerant splitters are used where zones include more than one head.

All zones and units, aside from the boilers and Dectron unit, are controlled and monitored by a Ventacity SBC (Smart Building Controller). The SBC provides the owner, service contractor, wholesaler or engineer with remote access.

"Because the SBC is BacNet capable, connecting the SBC to the hydronic and natatorium systems is possible," added Tomaszewski. "But it was decided to let those elements stand alone on this project."

Control is provided through



Two VRF units are installed on either side of the house, Fujitsu Airstage J-II and J-IIS.

CASE STUDY



The condensing unit for the natatorium system is installed just outside the pool.

the Fujitsu Service Tool built into the SBC. This provides an in-depth technical view into the system as it operates, displaying all information such as all temperature readings, refrigerant pressure readings, compressor amperage, etc. Each is continually recorded.

"The distributor, Wales Darby, came to the site early on, as did a few Fujitsu personnel during the SBC installation," said Tomaszewski. "Robert Inderwise, one of our commissioning agents also helped with start-up. Once his commissioning process is complete he can determine that the system is installed and operating as intended. This allows Fujitsu to confidently issue their extended 10-year warranty."

SIMPLIFYING THE SUBMITTAL PROCESS

"I began this project by sitting down with the installer and the homeowner and listening to their expectations," said Tomaszewski. "We discussed zoning, particularly how the owner wanted to break up the many different zones for air conditioning purposes.

This information, along with plenty of data provided by the general contractor, was entered into

Tomaszewski. "The program then creates a complete design and submittal package, including high- and low-voltage wiring schematics, a refrigerant piping diagram, and a materials and equipment list."

The homeowners were actively involved with the entire project, and requested a number of changes to both the floorplan and the HVAC systems before the home was completed. Using a VRF system permitted Ferguson and the installer a great deal of



Ferguson's Karol Tomaszewski and Fujitsu's Xiaofan Yang work on system controls during commissioning.

Fujitsu's VRF design simulator.

"If you can create the system in the Design Simulator, the system will work in the field," explained

flexibility that would've been more difficult with unitary systems. Line-set lengths were changed more than once, as were the size and style of the evaporators.

"This job would've looked a lot different 20 years ago, or even 10," concluded Tomaszewski. "It's amazing to see how HVAC technology has evolved, and also how the levels of comfort and efficiency have soared."

