

GlaxoSmithKline Rolls Out FlexiLab Design In U.S.

Retrofitting R&D Space to Accommodate Rapidly Changing Research

GlaxoSmithKline (GSK), a UK-based pharmaceutical and healthcare leader, has begun rolling out its FlexiLab facility design at research labs in the U.S. with the help of North Carolina-based Affiliated Engineers Inc. (AEI). The innovative design combines large open floor plans with moveable furniture and modular services to create highly flexible research space that can be easily customized by the end-user. Originally pioneered at R&D facilities in the UK, FlexiLab is proven to reduce construction and maintenance costs, and make laboratory reconfiguration easier, faster, and cheaper.

“New research methods are constantly emerging, and it’s hard to be sure what is going to happen in six months to years from now, so we wanted to come up with a flexible model that could accommodate the needs in R&D that we can’t imagine right now,” says Jim Holloway, a project manager with GSK’s Capital Projects Engineering Group.

GSK initially developed the FlexiLab design while reconfiguring the company’s R&D complex in Stevenage, UK. The company brought FlexiLab to the U.S. with the remodel of a three-story high-throughput facility near Philadelphia that opened in 2004. Working in conjunction with AEI, the company recently deployed the system at two more of its facilities in Research Triangle Park, N.C.

“We needed to accommodate different user groups—biology, chemistry, lots of robotics, and specialized equipment—so we developed a flexible space prototype, as opposed to a deeply customized lab,” says Nicholas Caronna of Affiliated Engineers Inc.

FlexiLab philosophy is driven by a number of industry factors. Due to the nature of the research, space demands can change rapidly as organizations compete for grant funding and scientists. GSK wanted to accommodate multiple user groups within the same space, allow for constantly changing equipment needs, and expedite the creative discovery process without compromising work environment.

“We wanted to create easily reconfigurable laboratories, but we also wanted to create a pleasant workspace that helps shorten drug discovery times,” says Holloway.

FlexiLab Essentials

Primary features of the FlexiLab design philosophy include open floor plans combined with mobile benches, relocatable fume hoods, and modular utilities delivered through ceiling panels or pods extended from the ceiling. Movable benches and plug-n-play services allow researchers from various disciplines to rearrange casework and equipment according to their immediate needs.

FlexiLab also places a strong emphasis on transparency and cross-disciplinary collaboration. Adding windows around a lab space helps create a more collaborative environment and supports increased communication between researchers.

“We feel strongly that having greater visibility creates a more productive and safer work environment,” says Holloway.

Repeated modular patterns reduces construction time and cost, and simplifies customer move-in and startup.

From the Ground Up

FlexiLab principles were well suited to GSK’s renovation of an 8,500-sf pharmaceutical development lab in Research Triangle Park, N.C. The facility—which was built on a tight deadline—was programmed to support automated robotics, high-throughput screening, and a newly formed research team.

“There was some urgency in getting this project completed. But, because it was a new group, there wasn’t a tremendous amount of definition from the customer regarding what equipment should go where. So it was very well suited to the FlexiLab approach,” says Holloway.

Most all of the available space was turned into a single open floor plan with moveable casework and relocatable fume hoods.

“Because the existing space was very old, the only thing we used from the existing facility was the floor slab, the external walls, and the roof. We installed all new air handling units, exhaust fans, and chillers,” says Holloway

Each fume hood is equipped with variable air volume (VAV) valves that are integrated into the building’s environmental control system. As users raise and lower their sashes, the air balance of the room shifts accordingly to maintain a constant negative air pressure.

Ceiling-mounted service tiles deployed every ten feet provide utilities to casework, fume hoods, and benches via flexible umbilical cords with quick-connect attachments. The pre-manufactured tiles fit in a standard 2 ft-by-2 ft ceiling grid and have color coded locking connections for gas, electrical, and data services. The quick connects are different sizes so the gas connections can not be accidentally cross-connected by the user. There are also open ports for other services to be installed later.

“At first, we considered making the service tiles moveable so they could be transferred from one ceiling tile to the next, but they are relatively inexpensive so we elected to install a lot of them in the locations where we would likely need them,” says Holloway.

While fixed elements like sinks, drains, and eyewashes are located along the few permanent walls, the rest of the room is reconfigurable based on research and equipment needs. The fume hoods rest on mobile tables so they can be easily relocated with a small forklift in a matter of hours. Casework can also be easily disconnected from the ceiling service tiles, moved, and reconnected without a single work order being filed.

“We put a small closet at the end of the room for a simple roll-up ladder because of the 10-ft high ceiling, so the users can make the utility changes themselves. It was a fairly minor detail, but it made the process work,” says Caronna.

Refinement Through Repetition

In June, GSK opened another smaller chemical development lab at Research Triangle Park to accommodate multiple visiting scientific users. The 2,100-sf facility was more complicated as renovation was done in two phases in relatively tight spaces.

“The challenge was to work within the existing infrastructure and be innovative with what’s available,” says Holloway.

The new R&D facility has all of the standard FlexiLab features—including moveable casework, integrated VAV airflow control, and redundant ceiling service tiles—but there are more lab gasses required.

The repetition of modular FlexiLab elements made it possible to renovate the lab rapidly, at a relatively low cost, in areas adjacent to office space that was still in use.

“The contractor had to operate in really tight quarters. They had to work around other office people so there was some overtime involved, but we were really pleased with the ease and simplicity of initial construction, and the much greater ease of future remodels,” says Caronna.

More to Learn

Exporting FlexiLab principles to the U.S. has helped GSK gain valuable information about what makes the system work. One important lesson was the significance of having everyone involved in the project be supportive of creating open flexible lab space.

“It can require a bit of a cultural shift for researchers to embrace the FlexiLab concept. With these projects everyone was really on board, especially the principal investigators,” says Caronna.

Some detail elements of the design are being revised as equipment changes to suit new research. For example, in addition to the ceiling mounted fume hood vents, designers installed additional drop down exhaust vents for miscellaneous equipment, which were originally four inches in diameter. These proved to be too small for much of the benchtop

equipment recently purchased. As a result, future designs will incorporate six- or eight-inch miscellaneous exhaust vents.

Repeating designs and mechanical elements significantly reduced construction and design time. Both of labs in Research Triangle Park recently opened and have been well received by researchers and facility administrators alike.

“The proof of success for us was the fact that the commissioning process went very smoothly, and the researchers were very pleased. In fact, on final walkthrough day the principal investigator and his staff started experimenting with arrangements by moving things around before we had even signed off from the contractor. They thought it was great,” says Caronna.

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Nicholas A. Caronna, PE, LEED is a senior project manager at Affiliated Engineers Inc. and is a licensed mechanical engineer in multiple states. He has been involved in the design of more than 1.3 million sf of lab space and has more than 25 years of experience in the programming of laboratories and challenging high-tech industrial and biopharmaceutical facilities. As the research technologies core team leader for the North Carolina office of AEI, he is responsible for the corporate laboratory, biotech, pharmaceutical, and high technology business sectors.

Jim B. Holloway, PE, is a project manager with GlaxoSmithKline in the capital projects engineering group. Holloway has more than 19 years experience in project management with GSK in the U.S. and the United Kingdom, and is currently responsible for planning and implementing research laboratory projects in various facilities in Research Triangle Park, N.C.

This report is based upon a presentation by Caronna and Holloway at the Tradeline *Research Buildings 2006* conference in May.

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FlexiLab design emphasizes the use of open floor plans combined with mobile benches, relocatable fume hoods, and modular utilities delivered through ceiling panels or pods extended from the ceiling and connected via flexible hoses. Movable casework allows researchers from various disciplines to rearrange room layout based on need. *(Photo courtesy of GlaxoSmithKline and Affiliated Engineers Inc.)*

Ceiling service tiles with twist-locking, color-coded connections are an essential part of the FlexiLab design. The 2-ft panels provide data, gas, and electrical services to benches, fume hoods, and casework via flexible umbilical cords. Open ports are included for other services to be installed later. *(Photo courtesy of GlaxoSmithKline and Affiliated Engineers Inc.)*



Relocatable fume hoods allow for maximum flexibility. Integrated into the rest of the facility with variable air volume (VAV) valves, snorkel exhaust drops, and ceiling-mounted services, they can be relocated in a matter of hours. *(Photo courtesy of GlaxoSmithKline and Affiliated Engineers Inc.)*