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Raised Floors: Are They Still Practical?

Inside The Rising Debate

by Christian Perry

Once a go-to element of nearly every architect's arsenal, raised floors now raise concerns for organizations looking to build or renovate data centers. Are these floors really more energy efficient than standard floors? Is the maintenance worth the cost and effort? Do they solve the challenges around cable management better than other solutions?

In fact, the topic is now hotly contested among designers and architects, who see enough advantages and disadvantages around raised floors to either continue using them without question or to seek alternatives—also without question. Because today's flooring path is no longer a straight one, it's wise to consider both sides of the issue before moving ahead with building plans.

The Case For Raised

According to David Atwood, general manager of Integrated Interiors at Work (www.iiawne.com), raised-floor systems offer the most flexibility in accessing underfloor power, particularly given the frequent changes in data center technologies. Further, he says these systems include a pressurized plenum for air delivery that's easily reconfigured and without disruption by shifting airflow tiles.

"The most valuable benefit of a raised floor in a data center is the ability under the floor to distribute high-voltage [and] low-voltage [electricity] and HVAC in an integrated space," says Thomas McElroy, principal of Level-1 Global Solutions (www.level-1.com). "It saves on space, and it saves on the cost of cooling from the standpoint that you can concentrate cooling exactly where you want it. You can control vents from a raised-floor design. So you have more direct control over what spots in a room are cool."

Atwood notes that early versions of raised floors failed to accommodate the ever-changing demands of data centers, with trim edges that

Key Points

- Raised floors are attractive due to their ability to cool entire rooms and hide cabling, but those same advantages can also serve as disadvantages, especially in high-density data centers.
- In metropolitan areas, building codes can force enterprises to obtain the costly services of multiple electricians and other service personnel to handle raised-floor installations.
- New raised-floor models work to eliminate problems inherent in older raised floors, but the concept is no longer a given for enterprises building or renovating a data center.



would break and become dislodged from panels, manufacturing processes that included zinc (which in turn leads to zinc whiskers), and warping issues. However, newer systems and strategies work to eliminate these problems.

“In low- or moderate-density data centers, the underfloor cavities become so jam-packed with cabling that air doesn’t effectively get to its intended destination. The current trend is to distribute cabling above the floor, eliminating air restrictions and [allowing] for proper airflow under the floor,” Atwood says.

When Raised Goes Wrong

When the prospect of high densities enters the equation, the concept of raised flooring becomes a bit dicier. Dan Hyman, co-founder of Custom Mechanical Systems (www.cmscooling.com), says it’s simply not feasible to cool high-density areas of data centers with raised flooring because they require more air than can be easily pushed through the floor.

“It also creates maintenance headaches, as many people need access to the space below the floor, and keeping it organized and clean is difficult. Moving equipment in and out of a raised-floor room can become quite complex,” Hyman says.

Raised floors can be pricey, as well. Code requirements alone can boost the price of installation in metropolitan areas, McElroy says, because construction codes in many urban areas require the use of different unionized trades. For a data center, this means securing the services of a low-voltage electrician, a high-voltage electrician, a plumber, and a carpenter to put in a raised floor.

“Attempts to deliver the best environment for data centers and resolve the challenges caused by the introduction of redundant systems and smaller, more powerful computer equipment resulted in packing more equipment per square foot than in the past, creating more heat. Therefore, many firms are rethinking the raised-floor concept,” says George Figliolia, president of Builders Group (www.buildersgroup.com).

Debate Remains Open

Despite the drawbacks to raised floors, they remain popular due to fear among data center managers in regard to having chilled-water piping above racks, explains Ryan Taylor, project director at Clayco (www.claycorp.com). Moreover, many notorious issues surrounding the use of raised flooring have been addressed with newer technologies.

For example, standard airflow panels can restrict airflow to high-density racks, but new, nonstandard panels can boost the air-flow and help to meet more aggressive cooling needs. Also, warping and dishing problems caused by excessive rolling loads are now prevented through the installation of high-capacity raised floors that can withstand higher loads.

But not all experts agree that raised floors are still the preferred option for data centers. Figliolia, for one, says that overhead air and cabling distribution appear to be winning out due to concerns among engineers and architects about the restricted space for cable management and poor airflow.

“Originally, the raised-floor concept was sold on the basis of cost comparisons, indicating that raised floors eliminate the need for cable trays and overhead duct work. However, experienced clients no longer believe raised floors are the best solution and are no longer persuaded that this cost justification is valid,” he says.

GPX Realty, a private real estate investment and advisory firm, used concrete floors in its latest data center project. Although raised flooring offers a clean appearance from above, that same appearance can become false over time as equipment and circuit design changes accumulate, says Chris Canale, vice president of operations at GPX. However, he says there remains a time and place for raised flooring.

“Where overhead space is limited, it makes ducting HVAC a close-to-impossible task. Energy costs of cooling data centers are rising, not due to heat output, but because utility costs are continually rising. Having the ability to control direct cooling to where it is needed vs. blast-cooling an entire space is the long-term cost strategy of many companies. This can be accomplished though overhead ducting or through the plenum of a raised floor,” Canale says.

Raised Floors: Yes Or No?

Raised floors have plenty of pros and cons, leaving architects and other experts with difficult decisions when it comes to building or redesigning data centers. But if faced with the decision, what exactly would they do? We asked several experts if they would recommend a raised floor for an average data center at a small to mid-sized enterprise.

“If you have a design that allows for overhead ladder racking, I would strongly lean to this construction for a data center. It allows for greater flexibility with cooling, fire suppression, power distribution, and circuit delivery.”

- *Chris Canale, vice president of operations at GPX Realty*

“The most flexibility and potential to handle high-density loads in various locations of the center is by use of a close-coupled [in-row] or overhead system. A raised floor would be a good solution for a modest computer room with loads in the range of 25 to 50 watts per square foot.”

- *Dan Hyman, co-founder of Custom Mechanical Systems*

“You have to make those kinds of decisions based on the requirements of the client. There is no one-size-fits-all for technology infrastructure. You can have 10 people working in a highly technical institution and have a raised floor. Or you could have 1,000 people working someplace who wouldn't need that at all if they are doing all of their work on the Web.”

- *Thomas McElroy, principal of Level-1 Global Solutions*