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Off the map: data centers in uncharted territory

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AI workloads are rewriting the rules of the data center. Power demand is climbing, rack densities are soaring, and cooling systems are being pushed to the brink. Here, Mike Slevin, Data Centers Manager at Fluke, looks at why maintenance has become the real frontline – and the only way to keep critical systems stable.



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The rulebook's been thrown out. Ten years ago, a 30-megawatt data center was considered big. Today, a 200-megawatt campus is now just normal. And capacity is growing all the time, with artificial intelligence blowing the roof off assumptions we all used to rely on. According to McKinsey,¹ for example, rack power densities have doubled in just two years and are expected to quadruple again by 2027. That's some scale-up.

In my view, that puts engineers in an entirely new operating environment. It's not just about building bigger facilities – it's about working across the lifecycle in conditions that didn't exist a few years ago. Commissioning teams are validating more complex systems under tighter deadlines. Installation leads are certifying thousands of links with no margin for delay. And maintenance crews are running plant that's permanently closer to its limits.

The operating window is getting tighter while expectations for uptime keep rising – a very different challenge to the data centers of even five years ago.

Power, cooling, cabling under strain

We all know power's a big deal. In the US, data center load is expected to climb from around 3–4% of the national grid today to 11–12% by 2030.² In practice that means UPS banks, generators, and switchgear are running hot.

We're often hearing maintenance engineers say they're spending more time firefighting harmonics than anything else – a silent problem that chips away at capacity until something gives. Tools like the Fluke 1770 Power Quality Analyzers give you the visibility to deal with distortion before it becomes downtime.

Then there's cooling. Racks running at double the density they did just two years ago are pushing air systems beyond their limits, and liquid plant is moving in to fill the gap. We know a lot of facilities managers are juggling both at once – legacy HVAC on one side, liquid systems on the other – and worrying about the blind spots between them. A Fluke 810 vibration tester will catch the early signs of a mechanical fault, while a TI 480 Pro thermal camera makes it obvious when something's about to overheat.

And let's not forget cabling. Adds, moves, and changes come thick and fast, and every link has to be proven and documented. But project leads tell us the real strain isn't running the tests, it's chasing down results across multiple teams and pulling them into a single audit trail that stands up to customer scrutiny. From what we see on site, the biggest win is standardization. Using a platform like Fluke Versiv, teams can certify copper or fiber, store the results in the cloud, and hand over proof without wasting days on paperwork.



1 <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-a-data-center?>

2 <https://www.mckinsey.com/industries/private-capital/our-insights/how-data-centers-and-the-energy-sector-can-sate-ais-hunger-for-power?>



Maintenance as the weak link

When new facilities are announced, the headlines focus on megawatts and capital costs. But those of us who work in the field know that maintenance is what makes or breaks them. Missed insulation checks, delayed thermography scans, or uncertified cabling changes are the small cracks that turn into outages.

Too often, maintenance is treated as a background task. The reality is that in high-density environments, a single overlooked anomaly can cascade into a major incident.

Preventive testing and predictive diagnostics aren't nice-to-haves anymore – they're essential.

Life on the ground

Keeping sites online takes more than technical skill. Every intervention has to be logged, every result tied to a standard, and every handover backed up with a clear audit trail. Infrastructure managers then are drowning in formats and systems – test results scattered across spreadsheets, PDFs, and vendor tools that don't talk to each other. Add to that the fact there simply aren't enough experienced hands-on site, and small mistakes creep in fast. Subcontractors roll on and off, teams change mid-project, and context gets lost along the way.

That's why simplicity and consistency matter. Tools that deliver a "first-time right" result, automatically generate clear reports, and share data through a common platform reduce the admin burden and free engineers to focus on solving problems.

Control under pressure

In my experience, the best-run sites are those that use maintenance as a control system, not an afterthought. They use thermal imaging to spot hotspots early. They track harmonics to protect UPS banks. They certify every new link rather than hoping for the best. And they keep the data in a form that can be shown to a customer or auditor on demand.

Fluke's role is to make that practical – from cable certification and cloud-based reporting with Versiv, to power quality analysis with the 1770 series, to thermal and vibration diagnostics across cooling plant. No tool removes the challenges created by AI growth, but the right ones give engineers confidence they can stay ahead of them.

It's this kind of pragmatic approach that Fluke has pioneered in the data center for decades – and it's perhaps more relevant today than it has ever been. We're already present in most of the world's biggest facilities, working alongside contractors, commissioning teams, and operators. From the first build and handover through to day-to-day operations, our tools and services support every stage of the lifecycle. That continuity matters: it gives teams a common foundation to work from, whatever changes come next.

Data centers have entered uncharted territory. The loads are heavier, the tolerances tighter, and the expectations higher than ever. Investment alone won't solve the problem. In my view, the only way to keep pace is to put maintenance at the center – across both connectivity and critical infrastructure. That's what keeps systems stable when everything else is shifting.

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For more on how Fluke is supporting data center teams from build to operations, check out [our website](#).

