Abstract:

The global economy continues to rely more and more on data centers, as over recent years a great deal of infrastructure has shifted from in-house, mainframe servers to virtual networks supporting activity through communication across multiple locations and public/private cloud services. Locations require a significant system of electrical hardware - including power substations, uninterruptible power supplies, ventilation & cooling systems, and backup generators.

These assets are critical to the data center operations and the clients they serve around the world, and that requires the proper staffing structure to ensure their design, function, and reliability. If not managed correctly, critical asset failure and unplanned downtime can be catastrophic not just to data center and client operations, but also to their reputations. The estimated downtime costs for a data center itself is over $8,000 per minute, and their clients losing valuable business capabilities becomes an exponential number. To be sure, the damage to the reputations of all involved can be described as nothing short of immeasurable.
Threats

A 2021 report from Uptime Institute made an in-depth study of the industry, focusing on Global Data Center Staffing Forecast 2021-2025. Their overview states that:

As the data center build out continues across the globe, many more people will be needed to design, build, and operate this critical infrastructure. The demand will exacerbate staffing shortages – but by how much?

Breaking down the workforce needs by region, by data center type, and by education requirements, the study finds that “digital growth continues to fuel strong demand for data center capacity...and across the board, the scale of capacity growth is stretching the critical infrastructure sector’s talent supply”. The proportion of data center managers that have reported difficulty in finding qualified staff rose from 38% in 2018 to 50% in 2020. This strain on data center staffing can be seen in the areas of staff volume, roles, and training.

Staff Volume

The expedited rate of growth for data centers obviously drives demand for higher staff numbers, and an impending wave of retirement by a large portion of the current workforce increases the stress put on data centers to be functionally scalable with their teams. Lack of capability to grow in this market sector means a lack of ability to compete, and that spells doom for those who can’t survive. On a global scale, raising a company’s (or the industry’s) visibility among job seekers, educational institutions, and other potential sources of staff means heavy investment in recruitment and hiring.

Staff Roles

Growth means new opportunity, which normally correlates in the labor market to a need for entry-level talent. With the retirement wave lurking, the expansion of data centers will also require senior staff to fill existing roles. From the design and construction of these centers to the IT and engineering services required for operations, companies will have to harvest both from the university/technical school system as well as current workers within and outside the industry. According to the Uptime Institute report, “the bulk of staff will be needed for ongoing data center operations, with a smaller proportion required for the design and build of new or retrofitted facilities”. As most design and physical construction involves a good deal of outsourced labor, the focus should be on the staff responsible for on site operations that include business operations, IT, and hardware/electrical engineering.

Staff Training

New hires from the university/technical school world, as well as those transitioning from other industries, will need effective training. The educational world undoubtedly gave students both theory and practice experience, but there is no substitute for learning on the job. Hires from other industries will have had enough requisite experience to get the position, but will need the right training to bridge the knowledge and skills gap.
Solutions

So how do you overcome the conflicting issues of scalable growth and minimized workforce availability? The answer is quite simple: do more with less. Streamlining many required activities, as well as increasing the effectiveness of training, will allow data centers to increase their client base and revenues while reliably providing the services clients need. Regarding the power-related segment of the industry, which is the backbone and lifeline of data center operations, solutions can be found through both technology and training.

Designing for Safety & Reliability, data centers can map out a strategy to overcome the issues currently faced by the industry around the world. From design stage to daily operations, this will allow data centers to scale their growth, increase process efficiencies, and lower overall operating costs.

Technology

Adopting a “Monitor, Inspect, & Manage” approach, data centers can avoid the concerns at hand by maximizing the value of workforce time and skill. Scalability is no longer an issue when, instead of needing to go through the time and cost of expanding their workforce, they can apply the technologies at whatever volume is needed. These Reliability Technologies can either be specified with the engineer and OEM at the initial design/build stage, or retrofitted into existing equipment through a simple and inexpensive process.

Implementing a wireless temperature monitoring system, critical asset condition data can be continually collected, trended, and analyzed. A simple monitor device can be attached that feeds data through a gateway and into simple software programs that can be accessed by workstations and mobile devices. An array of custom parameters can be established, based on a number of environmental and operational factors, that notify an employee of possible issues with asset health.

Once the alarm notification is received, asset condition will need to be assessed in person. With the use of an inspection window, a single worker is able to conduct visual, infrared, and ultrasound inspections simultaneously using compact, handheld equipment. With panel removal no longer necessary, assessments can be done of the asset in an energized state. The process creates a faster, less labor-intensive inspection process that allows more assets to be checked in a shorter amount of time.

The data collected during inspection can then be stored through an intelligent asset management solution. From the asset location, information can be both stored and transmitted into a dashboard system that is also accessible from workstations and mobile devices. Customizable reports and routes can be established after data analysis to further increase efficiency.
These technologies not only increase the overall efficiency of the program, but also eliminate risk-based behaviors by staff and comply with NFPA 70E guidelines. Covid-era guidelines for distancing, socially and professionally, are also achieved through the minimized need for staff.

Training

Shifting to a new system for the electrical maintenance team means training, for new and veteran staff alike. With “Monitor, Inspect, Manage”, the use of technology allows for single individuals to accomplish inspection tasks with minimal training. Specialized skill sets of electrical-focused staff can focus any necessary maintenance/repair activities.

Another Covid-era issue with learning is that most educational institutions have transitioned to online models. The electrical world can benefit from adding this type of education and certification to on-the-job training programs. These online systems offer on-demand educational and training resources that teach the use of these specific reliability technologies. The workflow being streamlined means that the skill-set requirements can be minimized to specific tasks.

Conclusion

Critical power assets being monitored remotely cut down on the routine tasks required of technicians focused on engineering and electrical operations by providing around-the-clock coverage. When an alarm notification is received, inspection windows allow an individual technician to easily do visual, infrared, and ultrasound assessments of the energized equipment. The data collected on the asset can then be stored, trended, and analyzed through the management software. This process increases the Mean Time Between Failure (MTBF) by allowing for planned shutdown and maintenance only when it is necessary.

Staffing issues brought about by the combination of an expanding market and a shrinking labor pool can be overcome by streamlining operations through technology. Both hardware and software involved can be easily integrated at minimal expense, and the employees responsible for their use can be trained through a combination of online and on-the-job training.

Reliability Technologies at a data center will assist in overcoming three major issues facing the market today, and over the next decade. With explosive growth necessary to succeed on the global scale, implementation of these technologies will allow data centers to do more with less.