Buying a Data Center

LIFTING
DEVICE

Are You Using the Right Tools to Manage Your Data Center?

Best Practices in Data Center Infrastructure Handling

It is a Tuesday afternoon in a major airline's data center.

A worker pulls out a metal tool instead of a rubber-coated one. The power system short circuits. Substantial parts of the airline's computer system go down. Tens of thousands of passengers are grounded and millions of dollars are lost.[1]

IN THE DATA CENTER, HAVING THE RIGHT TOOLS MATTERS.

For organizations for which the data center is mission critical, downtime can mean tens of thousands of angry customers and many millions of dollars in losses – or worse. Yet 48 percent of respondents to Ponemon Institute's *2013 Study on Data Center Outages* said that they had experienced a data center outage caused by human error. 71 percent of reported outages were preventable.[2]

Preventing downtime is one of your toughest jobs as a data center manager. But it can be made easier when you rely on the right tools: Data Center Infrastructure Management for monitoring and control. Advanced power distribution and backup systems for reliability. Biometric scanners for physical security. And a purpose-built Data Center Infrastructure Handling (DCIH) device to safely and efficiently move IT equipment.

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[1] *True story: AP, <u>American cancels all US flights for several hours</u>, 16 Apr 2013.*

[2] Ponemon Institute, <u>2013 Study on Data Center Outages</u>, September 2013.

Moving IT equipment is one of the most common activities in the data center. In the majority of data centers, equipment is moved manually. Some use a general-purpose materials handler or warehouse lift. But best practice data center operators take the same approach to moving IT equipment as with every other data center activity: They use the right tool. Specifically, a Data Center Infrastructure Handling (DCIH) device.

Moving IT Equipment in the Data Center Manually

Brute strength is the most common "tool" for moving IT equipment in the data center. (Counterintuitive, perhaps, in an environment where employees are hired for their brains, not their brawn.)

Servers and other rack-mounted equipment can weigh up to 800 pounds. According to the National Institute for Occupational Safety and Health (NIOSH), the maximum weight to be lifted with two hands *under ideal conditions* is 51 pounds.[3] And conditions in the data center are typically far from ideal: Most server racks extend from the floor to nine feet, well outside what the California Department of Industrial Relations calls the "power zone" (that is, between the shoulders and the knees).

THE MAXIMUM WEIGHT TO BE LIFTED WITH TWO HANDS *UNDER IDEAL CONDITIONS* IS 51 POUNDS.[3]

Indeed, popular server manufacturers such as Oracle and Hewlett-Packard specify a minimum of 2 people to install 2U servers and up to 4 people to handle heavy equipment. Yet according to the California Department of Industrial Relations, "team lifting can increase the risk of a slip, trip, or fall accident."[4]

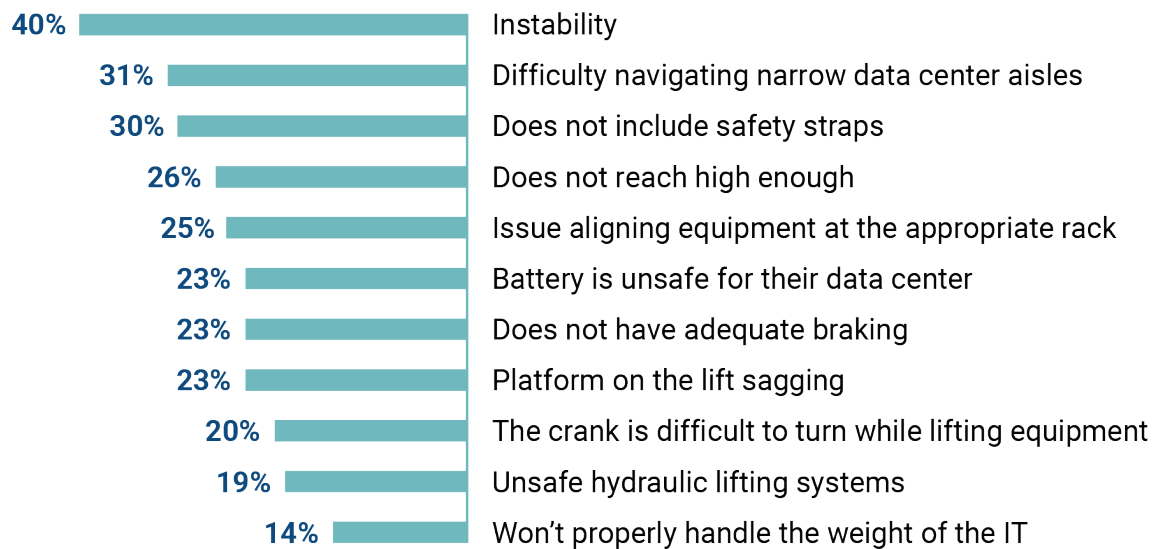## Moving IT Equipment in the Data Center with a General-purpose Materials Handler or Warehouse Lift

Some data centers rely on a general-purpose materials handler or warehouse lift for moving IT equipment in the data center. But that tool, too, has problems in the data center environment.

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3 *California Department of Industrial Relations, Ergonomic Guidelines for Manual Material Handling, 2007.*
4 *ibid.*

% OF DATA CENTER OPERATORS REPORTING PROBLEMS WITH WAREHOUSE LIFTS

%	Problem
40%	Instability
31%	Difficulty navigating narrow data center aisles
30%	Does not include safety straps
26%	Does not reach high enough
25%	Issue aligning equipment at the appropriate rack
23%	Battery is unsafe for their data center
23%	Does not have adequate braking
23%	Platform on the lift sagging
20%	The crank is difficult to turn while lifting equipment
19%	Unsafe hydraulic lifting systems
14%	Won't properly handle the weight of the IT

Source: ServerLIFT data center operator survey, Interop 2014

There are some excellent warehouse lifts on the market that are great for lifting things in warehouses. They're not built for lifting IT equipment in the data center. After all, the needs of warehouse operators and data center managers are very different. For instance:

1. **Precision.** Because most servers are now mounted at the back of the rack, they must be aligned precisely to match the screw holes. Not so with a pallet on a warehouse shelf.

2. **Stability.** In a data center, the server will spend some time on the lift as an operator loads it into the rack. Most warehouse lifts are designed for lifting, moving, and placing – not holding.

3. **Maneuverability.** Data center aisles are much narrower – typically at least twice as narrow – as warehouse aisles. Warehouse lifts are not designed to navigate narrow aisles and tight turns.

4. **Containment.** Many warehouse lifts have hydraulics, with fluids that are restricted from use in most data centers.

5. **Sensitivity.** In a data center, all infrastructure – from the floor and ceiling panels to the cabling to the cabinets, racks, and servers themselves – is much more fragile than warehouse infrastructure.

Wrong Tool Risks

Two of the chief risks associated with moving IT equipment in the data center with the wrong tool are equipment damage and employee injury. These are the kinds of risks that keep you CFO up at night.

Equipment Damage

In a survey of data center operators at the Interop conference in 2012, 64 percent of respondents said they knew of at least one incident when rack-mounted IT equipment was dropped and damaged in the data center. 16 percent knew of ten or more incidents.

EQUIPMENT DAMAGE IN THE DATA CENTER

64% of surveyed data center managers know of IT equipment damaged after being dropped in the data center

36% 1-4 Incidents	12% 5-9 Incidents	16% 10+ Incidents

Source: ServerLIFT data center operator survey, Interop 2012

Those are expensive incidents. Consider, for example, the story of the federal contractor who sued the server manufacturer for $1.4 million after a server fell off a forklift and was irreparably damaged while it was being moved into the customer's facility. The contractor blamed the manufacturer for not packaging the server well enough. But servers are neither designed nor packaged to fall off forklifts. Or out of a data center operator's hands.

Even when *a* tool is used to move IT equipment – a warehouse lift, for example – if it's not the *right* tool, equipment damage is still a risk. Imagine, for example, what would happen to overhead cabling if an errant warehouse lift punched through the ceiling panel. Or worse, what would happen if a server cabinet was bumped by a warehouse lift not designed to make the tight turns in a data center.

Data center infrastructure is not designed to be punched and bumped. So in an environment in which the cost of the facility – from the building itself to the infrastructure inside it – can run into the hundreds of millions of dollars, mitigating IT equipment and infrastructure damage can avoid the kinds of costs that keep your CFO awake at night.

Employee Injury

In a survey of data center operators at the Interop conference in 2012, 52 percent of respondents said that they knew of injuries sustained while moving rack-mounted IT equipment in the data center. 14 percent knew of four or more injury incidents.

The total employer-borne cost of workplace injuries includes direct costs such as medical bills and worker's compensation payments. It also includes indirect costs such as employees' lost productivity due to time away from work and chronic musculoskeletal problems that limit ability.

Those costs are significant: $175.6 billion in 2014, according to the National Safety Council.[5] The average cost to an employer of a single back injury is more than $50,000.[6] And those don't account for the cost to the injured employee – costs that can include a lifetime of chronic pain and limited ability.

INJURIES IN THE DATA CENTER

52% of surveyed data center managers know of injuries sustained while moving IT equipment in the data center

38% 1-4 Injuries	14% 4+ Injuries

Source: ServerLIFT data center operator survey, Interop 2012

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[5] *National Safety Council, Injury Facts, 2014.*

[6] *California Department of Industrial Relations, Preventing and Reducing Costly Injuries and Illnesses, 2008.*

Moving IT Equipment in the Data Center with a Data Center Infrastructure Handling (DCIH) Device

Best practice data center operators take the same approach to moving IT equipment as with every other data center activity: They use the right tool. Specifically, a Data Center Infrastructure Handling (DCIH) device. And in doing so, they mitigate the risk of equipment damage and employee injury, and realize benefits like boosted productivity, higher employee morale, and lower attrition, too.

Identifying a True DCIH Device – 14 Factors

To differentiate between a general-purpose materials handling device or warehouse lift and a true purpose-built DCIH device, best practice data center operators consider 14 factors.

1. *Design intent.* Is the device designed to be used in a data center? The needs of data center operators are very different than the needs of warehouse operators, so the right tool for moving IT equipment in the data center is one that was purpose-built for moving IT equipment in the data center, built to suit the following 13 factors.

2. *Load capacity.* Is the device's rated capacity able to handle the weight of the IT equipment you need to lift or may need to lift in the future? When you consistently lift equipment heavier than the lift is rated for, you wear down the machine – and increase total cost of ownership. Plus, you run the risk that the lift will fail, damaging the very expensive IT equipment you've just raised 6 feet into the air.

3. *Compliance.* Does the device comply with local regulations and is it certified as such? All data center devices must be certified to ensure that radio frequency disturbance levels stay below a certain threshold and that minimum safety standards are met. The certifications are based on compliance with local regulations such as FCC/IC (North America) and CE (European Union). Devices that are not in compliance can endanger data center employees and equipment.

4. *Operating controls.* Are the device controls easily accessible from a variety of operator positions? When you're installing rack-mounted IT equipment, you need line of sight with the rack in order to make the precise height adjustments necessary to align the equipment. Ambidextrous operating controls that are easily accessible from any position ensure that you have a clear line of sight, whatever the environment.

5. *Platform stability.* How rigid and stable is the device under load? One of the common complaints among data center operators using warehouse lifts is that the

lift platform sags. (When you add weight to the end of an object, the force on that object increases – that's known as deflection. Because the arms on a warehouse lift were not designed to bear the full weight of a load, the arms of a warehouse lift used in the data center often sag due to deflection.)

A purpose-built DCIH device, in contrast, is designed to bear the loads common in a data center, where the weight of the load is equally distributed across the platform, and keeping the platform flat is essential – both for ease of installation and to mitigate the risk of equipment damage.

6. **Equipment positioning.** In which orientation does the device position equipment? In the data center environment – where aisles are narrow and equipment may be populated on both sides – maneuvering a front-loading warehouse lift can be a significant challenge. In contrast, a purpose-built DCIH device is designed for maneuverability in the data center, and positions equipment from the side to allow for easy racking on either side of the aisle.

7. **Equipment security.** Can the equipment be secured to the device platform? When you're moving a million-dollar piece of IT equipment through the narrow aisles and around the tight turns of the data center then lifting it high into the air to load into a rack, securing that equipment goes a long way toward mitigating the risk of damage.

8. **Micro adjustment scale.** Is the device capable of making incremental up/down movements? When a warehouse operator is placing a box or pallet on a shelf, being and inch too high is not a problem. When you're trying to align a server with the screw holes at the back of the rack, precision is essential. A DCIH device is capable of incremental up/down movements delivers that precision.

9. **Lifting speed.** How quickly can the device lower or raise a maximum load? At the same time that precision matters, when you're lifting a server 9 feet into the air, you want the lift to move fast the first 8.75 feet. Time is money, after all. So the ideal DCIH device can be raised or lowered incrementally for precision and can move quickly up or down for efficiency.

10. **Platform range.** What is the vertical range (lowest to highest position) of the device's equipment platform? You might need to load a server at the top of a 9-foot tall rack. Or at the floor. A DCIH device should accommodate that full range.

11. **Overhead safety.** Does the device have safety measures to prevent damage to the data center facility? When you're loading a server at the top of the 9-foot tall rack, what happens if you misjudge and keep your finger on the "raise" button too long? Low ceilings, overhead cable trays, cold/hot aisle containment areas and seismic re-enforcement structures are often part of the data center environment. If you

punch through that infrastructure, what does it cost you? A DCIH device should have built-in, dynamic safety measures to automatically stop the lift if it touches anything overhead.

12. **Braking system.** Does the device have a braking system that effectively prevents movement during lifting and install? When you're loading a 200-pound piece of IT equipment into a rack, aligning it precisely, then securing it in the rack, you'll be doing a fair amount of movement while the equipment is on the lift platform. Your DCIH device should stay put in the process.

Braking systems with only a single point of contact to the floor may prevent directional motion, but can still rotate about the single braking point. Mechanisms with multiple locking points depend on the operator engaging all of the locking points. A DCIH device should have a braking system with exactly two points of contact to the floor and a single point of activation for the operator.

13. **Wheels.** Are the casters or wheels of the device adequate for traversing the data center floor without damaging it? The raised floor of a data center is typically made of grated tiles, which can be easily damaged by lift wheels that are thin, small, and/or made of metal. A DCIH device should have large diameter wheels made of non-scuffing material to navigate a raised floor smoothly and safely, no matter the load.

14. **Containment.** Does the device have components that contain hazardous fluids or compounds that are restricted from use in your data center? Hydraulic lifts – like the kinds used in many warehouses – often contain liquids that could cause significant damage if leaked in the data center. A DCIH device should be built only with materials certified for use in the data center.

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[7] *Lee Technologies, The Hitchhiker's Guide to Data Center Facility Operations, 2011.*

Right Tool Benefits

In using a Data Center Infrastructure Handling device for moving IT equipment in the data center, best practice data center operators mitigate the risk of equipment damage and employee injury – and realize benefits like boosted productivity, higher employee morale, and lower attrition.

Improved Productivity

It normally takes at least 20-30 minutes for two or more IT technicians to manually install a piece of heavy rack-mounted equipment. If those two technicians could do the job in half the time, you get a 100% uptick in productivity. **On jobs that take at least three employees 20-30 minutes, a DCIH device that enables just one employee to do the job in half the time delivers a 300% uptick in productivity.**

When your employees can move IT equipment more efficiently, they have more time to focus on higher value tasks. And imagine how much easier scheduling would be if anyone – regardless of physical strength – could rack a server.

Improved Morale and Lower Attrition

There are other benefits, too.

"Improving the fit between the demands of work tasks and the capabilities of your workers can increase worker morale in addition to productivity," according to the report Ergonomic Guidelines for Manual Material Handling. In an environment in which "recruiting talented individuals in specific technical disciplines that are capable of working together as a team is an extremely challenging task," keeping employees happy can be a significant determinant of your success as a data center manager.[7]

PRODUCTIVITY INCREASE
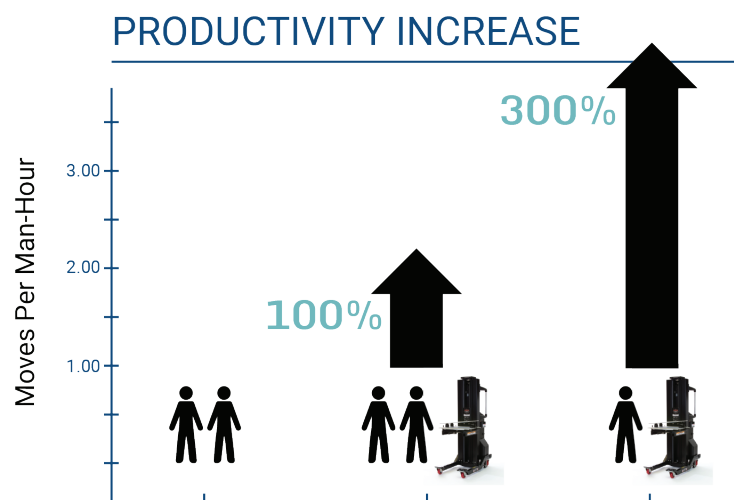
Realize up to 300% increased moves per man-hour when using a Data Center Infrastructure Handling device for moving IT equipment in the data center.

Data Center Best Practice:
The Right Tool for the Job

You would never bring a metal wrench into the data center. It's the wrong tool for the job, and it's incredibly dangerous. Best practices data center operators take the same "right tool for the job" approach to moving IT equipment – one of the most prevalent data center activities, after all.

Over 40 percent of the Fortune® Global 100 companies rely on a ServerLIFT DCIH device.

Where some data center operators might move IT equipment manually or with a general-purpose materials handler or warehouse lift – risking equipment damage and injury in the process – a best practices data center operator uses the right tool, a Data Center Infrastructure Handling device.

Which kind of data center operator are you?

Download a free copy of the *14 specification for a Data Center Lifting Device.*

About ServerLIFT® Corporation

ServerLIFT is revolutionizing the IT hardware industry worldwide with purpose-built, data center certified Data Center Infrastructure Handling (DCIH) solutions. ServerLIFT DCIH devices are built for precision, stability, and maneuverability in the data center. The most sophisticated data center operators in the world rely on ServerLIFT.

See for yourself. Schedule a live demo of a ServerLIFT DCIH solution – visit serverlift.com/ServerLIFT-Demo or call 602-254-1557.