SpotSee®

Know Before You Install: Protecting Data Center Equipment

Reduce Shipping Damage and the Risk of Hidden Failures



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There's a Long Road Before the Hum of Uptime.

Data center environments are designed for control. Power, temperature, humidity and access are all closely managed. But the journey your equipment takes to get there is different.

Before a server or populated rack reaches the receiving dock, it may pass through numerous facilities, vehicles and handling points. Each handoff creates an opportunity for rough handling, and a crate that appears intact upon arrival may reveal little about what happened along the way.

More Value Is Moving in Every Rack

Data center infrastructure is becoming more integrated, with greater computing capability packed into individual racks. Manufacturers can deliver preconfigured systems that combine computing, networking, power and cooling hardware, reducing the assembly required on-site.

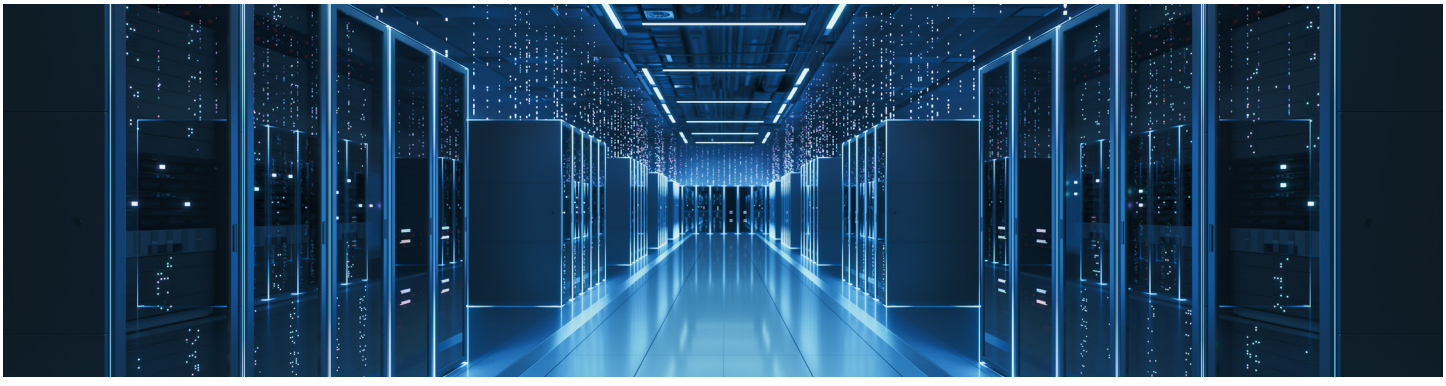
A conventional populated server rack can contain hundreds of thousands of dollars in hardware. Some AI rack-scale systems take that concentration of value much further. For example, NVIDIA's GB200 NVL72 system combines 72 graphics processing units (GPUs) and 36 central processing units (CPUs) in a single liquid-cooled rack. Industry estimates have placed its value at approximately $3 million, with next-generation systems valued even higher.

Conventional servers, storage arrays, networking equipment and other high-value data center hardware also face handling risks. As systems become more integrated, a single incident may affect multiple components, complicating inspection and repair.

Damage Doesn't Always Leave a Mark

Sudden impacts can damage circuit boards, connectors, solder joints and other sensitive components without leaving obvious signs on a shipping crate. Some problems may not become apparent until the equipment is installed, powered up or placed under load.

Impacts can bend mounting rails, loosen connections or damage supporting hardware in populated racks. Sustained vibration can stress components and connections, while excessive tilting can compromise a rack's stability.



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The International Safe Transit Association (ISTA) established a Rack Transport Stability Team to develop voluntary testing procedures and handling guidance for large information technology products. Participants have included Dell, IBM and Oracle, along with logistics providers and testing organizations.

If damage goes undetected until installation, technicians may need to disconnect equipment, perform diagnostics or remove a rack for repair. Operators may also face additional freight charges, rehandling expenses and changes to deployment schedules.

Even when damaged equipment is covered by insurance or a supplier warranty, delays in obtaining a suitable replacement can jeopardize the deployment schedule. Specialized servers, processors and integrated systems may not be readily available, with procurement lead times for some critical components stretching to several months or more.

The Right Call Comes Before Installation

A visual inspection can reveal damage to packaging or equipment, but may offer little insight into handling events that occurred earlier in the journey. Condition monitoring can help fill that gap, providing information about potentially damaging impacts, improper orientation and, with connected devices, when and where an incident occurred.

Quality and operations teams can use this information to make three receiving decisions:

PROCEED



If there are no visible problems or indications of potentially damaging handling events, the equipment can continue through the normal receiving and installation process, subject to standard checks.

INSPECT



If an indicator has activated or monitoring data reveals a concerning event, the shipment can be flagged for closer examination. Depending on the equipment and circumstances, that may involve checking mounting hardware, connections or other components before installation.

HOLD



If the evidence raises significant concerns, the receiving team can isolate the shipment pending further evaluation or instructions from the manufacturer, supplier or quality team.

An activated indicator doesn't necessarily mean equipment has been damaged. Likewise, a shipment with no recorded threshold event isn't guaranteed to be free of problems. Knowing when and where a potentially damaging event occurred can help receiving teams target their investigations and provide useful documentation for discussions with suppliers or logistics partners.

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Choose the Visibility Your Shipment Requires

Not every data center shipment needs the same level of monitoring. A relatively straightforward server delivery may require only an indication that a potentially damaging impact occurred. A fully populated rack or specialized system may warrant more detailed information, particularly when multiple carriers and handling points are involved.



A simple impact indicator such as ShockWatch 2 QR activates when an impact exceeds a selected threshold, giving receiving teams a visible reason to inspect the equipment more closely. A smartphone scan can also capture the indicator's condition, time and location, creating a digital record at each designated checkpoint.

Tilt indicators serve a different purpose. Equipment that must remain upright can be monitored for excessive tipping, with options ranging from a simple visual indication to more detailed information about the direction and degree of tilt. For example, TiltWatch XTR QR provides a visible indication and scan-based documentation when a shipment tips beyond 80 degrees. TiltWatch Plus can indicate the direction and extent of tilting, including whether the shipment overturned.

Connected monitoring provides another level of visibility. For high-value shipments such as integrated rack-scale systems, knowing that an impact occurred may be only part of the information needed. A device such as SpotBot GL can record the time, location, severity and direction of an impact above a configured threshold, transmitting the information through cellular or Wi-Fi networks when connectivity is available.

During a complex logistics journey, an alert about a potentially damaging event can give quality and logistics teams time to investigate before the shipment arrives. Knowing when and where the incident occurred can help them identify the relevant handling points and prepare for any inspection needed at delivery.

There's No Universal G-Force Threshold

A threshold suitable for one shipment may be inappropriate for another. Dimensions, weight, configuration and packaging all influence how it responds to an impact. Individual components may also have different sensitivities. For example, a populated rack can contain equipment with different tolerances, making it important to select indicators based on the specific shipment rather than a universal acceleration limit. SpotSee provides a ShockWatch 2 QR selection tool to help you find the right impact indicator. If you're not sure how sensitive the equipment is or how well the packaging protects it, check with the manufacturer and review any available test data before choosing a threshold.

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Use What You Learn to Improve the Next Shipment

A record of potentially damaging events can be useful long after a shipment reaches its destination. By collecting condition data across multiple deliveries, quality and logistics teams can identify recurring patterns in how shipments are handled.

For example, repeated impact alerts associated with a particular transfer facility could point to a handling problem worth investigating. Events concentrated along a specific route might prompt a review of transportation methods or packaging. If certain equipment configurations consistently trigger alerts, manufacturers may need to evaluate how those systems are secured and protected during shipment.

Connected monitoring can associate impact events with times and locations, helping teams identify which stages of the journey deserve attention. Scan-based records can document an indicator's condition at designated checkpoints, providing additional context about when a concerning event was first observed.

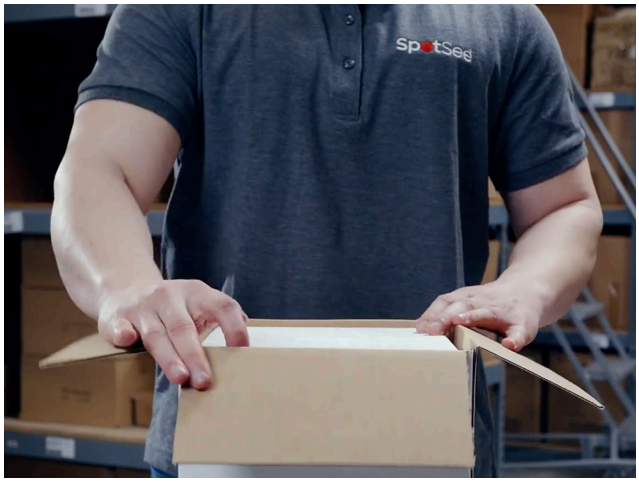
Condition records may also help resolve disputes when equipment arrives damaged. They can provide documentation for discussions with carriers, suppliers and insurers, although determining responsibility still requires supporting evidence about the shipment, the damage and the circumstances involved.

Over time, findings from multiple shipments can inform packaging changes, handling instructions, carrier evaluations and route selection.

Reduce Uncertainty Before Deployment

Every shipment arriving at a data center represents an investment in equipment, computing capacity and the work required to bring it online. Knowing whether that equipment experienced potentially damaging handling events can help protect that investment before installation begins.

With the right condition information, quality and operations teams can focus inspections where they're needed, keep equipment that clears receiving checks moving through the deployment process and avoid committing additional resources to equipment that may require attention.

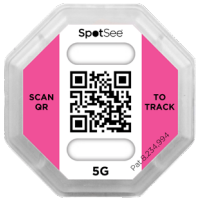


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Know What Happened Before You Install

SpotSee offers impact and tilt indicators, along with connected monitors, to help quality, operations and logistics teams identify potentially damaging handling events, document shipment conditions and make more informed receiving decisions.



ShockWatch 2 QR

Impact Indication With Digital Traceability

ShockWatch 2 QR is a single-use impact indicator that turns red when a shipment experiences an impact above a selected threshold. A quick smartphone scan records the indicator's condition, time and location, creating a digital record in SpotSee Cloud. No batteries or special scanning equipment are required.



TiltWatch XTR QR

Simple Tilt Detection With Scan-Based Documentation

TiltWatch XTR QR provides a permanent visual indication when a shipment tips beyond 80 degrees. The battery-free indicator turns red, while a smartphone scan captures tilt status, time, location and identifying information in SpotSee Cloud. It's a straightforward option for equipment that must remain upright.



TiltWatch Plus

Detailed Tilt and Overturn Indication

TiltWatch Plus provides more detailed information about a shipment's orientation during handling and transport. Three indicators show the direction and degree of tilt to the left or right and whether a complete overturn has occurred, helping receiving teams identify shipments that may require closer inspection.



SpotBot GL

Connected Impact Monitoring With Location Visibility

SpotBot GL monitors impacts along three axes, recording their severity, direction and the associated time and location. The reusable device transmits shipment information to SpotSee Cloud through cellular or Wi-Fi connectivity, allowing teams to receive alerts about potentially damaging events during transit. Configurable thresholds help tailor monitoring to the shipment's requirements.

Learn more about protecting your data center shipments at
www.spotsee.io/contact