



An IoT Solution for Real-Time Inventory Management

“ Inventory that Counts Itself ”

A LOADSTAR SENSORS WHITE PAPER
ON WEIGHT-BASED INVENTORY TRACKING & AUTO REPLENISHMENT



IN BRIEF

Real-time monitoring of inventory items is a critical component of just-in-time (JIT) inventory management, automatic replenishment, and vendor managed inventory (VMI) programs. But while bar code scanning and RFID tracking systems are well established to track large or discrete inventory items, solutions to track small or non-discrete bulk items – such as fasteners, fittings, liquids, powders and gases – have remained elusive.

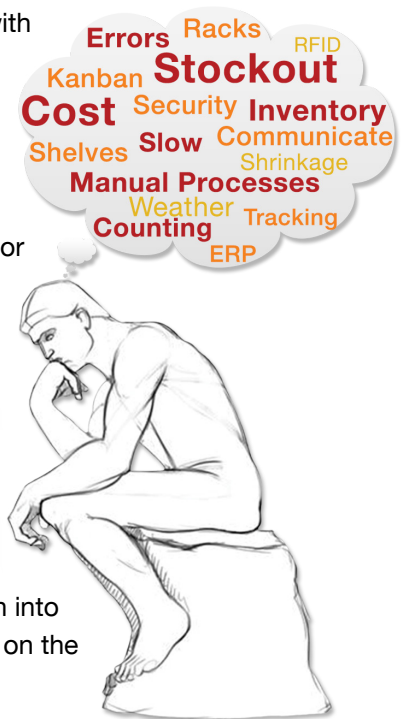
Enter StockVUE, by Loadstar Sensors. StockVUE is a proprietary, patented system that leverages advanced “Internet of Things” (IoT) technology, including state-of-the-art digital load sensors, wireless data routing and cloud-based analytics, to enable cost-effective, highly accurate and easy-to-use continuous monitoring of bulk inventory items. With StockVUE, manufacturers, distributors and retailers alike can automate the monitoring of their bulk and weight-based inventory items to avoid unexpected stock-outs and optimize their lean inventory management processes.

THE PROBLEM

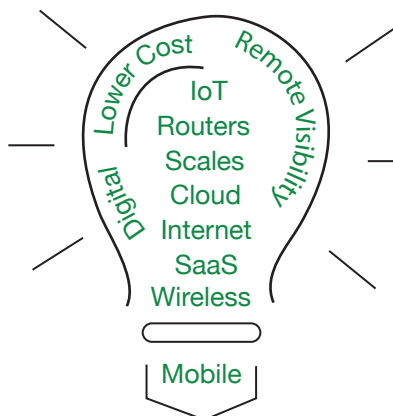
Over the past several decades, businesses have harnessed new processes together with hardware and software technology to optimize management of inventory levels across the value chain – from the factory floor to distribution warehouses to stockrooms and retail store shelves. The benefits of lean inventory management are well known and include lower working capital requirements, less inventory shrinkage, and reduced exposure to stock-outs. And while businesses have largely automated their tracking of larger, discrete or higher-value inventory items, the monitoring of bulk, non-discrete or lower-value items remains a challenge. However, the need is just as great – imagine a state-of-the-art assembly line coming to a grinding halt just because a basic fastener ran empty... and the thousands of dollars per minute (or more) such a shutdown could cost the manufacturer.

Even where businesses do a good job of monitoring the inventory of such bulk items, this is done predominantly by human beings that need to go visit the location of the items and visually (or using bar code readers) identify the items that are low and need replenishment. These manual processes are difficult to enforce or manage and are very expensive to implement. If an employee does not enter the correct information into expensive ERP and Warehouse management systems then there is a cascading effect on the supply chain with incorrect data.

There is a huge unmet need to automate the inventory counting process so as to reduce the manual and labor intensive process of inventory management. StockVUE, by Loadstar Sensors, addresses this need.



THE STOCKVUE SOLUTION

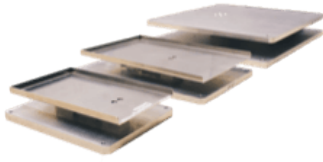


StockVUE is a patented, proven weight-based inventory management system that uses networked digital scales to continuously compute inventory counts and fill-levels. Information is maintained in a secure database in the cloud, and the system generates alerts due to shortages, usage rates or sudden change in stock. Key stakeholders – including plant and warehouse managers, vendor representatives, route managers, and even a hospital nurse tracking patient IV lines – can access this data from anywhere, at any time and on any Internet-connected device.

The StockVUE solution is highly accurate within a wide temperature span, handles a wide range of weights and sizes, and is easy to implement and integrate into a firm’s existing ERP or Warehouse Management System.

StockVUE COMPONENTS

Digital scales with high accuracies are connected to sensor routers that wirelessly connect and upload data to a server in the cloud. This data is then processed to compute item counts which can then be accessed using a PC, Tablet or Phone to receive updates and alerts about low inventory or sudden changes in inventory indicating theft or pilferage.



Digital scales

Wide-range of sensors with weight capacities of 100 grams to 100 tons. Scales are accurate to within 0.02% of full-scale range and operate in -10C to 40C temperatures.



Sensor routers

The 12-port sensor routers collect data and upload it to the server wirelessly. The routers support a wide-range of data interfaces, including USB, Serial, Wi-Fi and Zigbee.



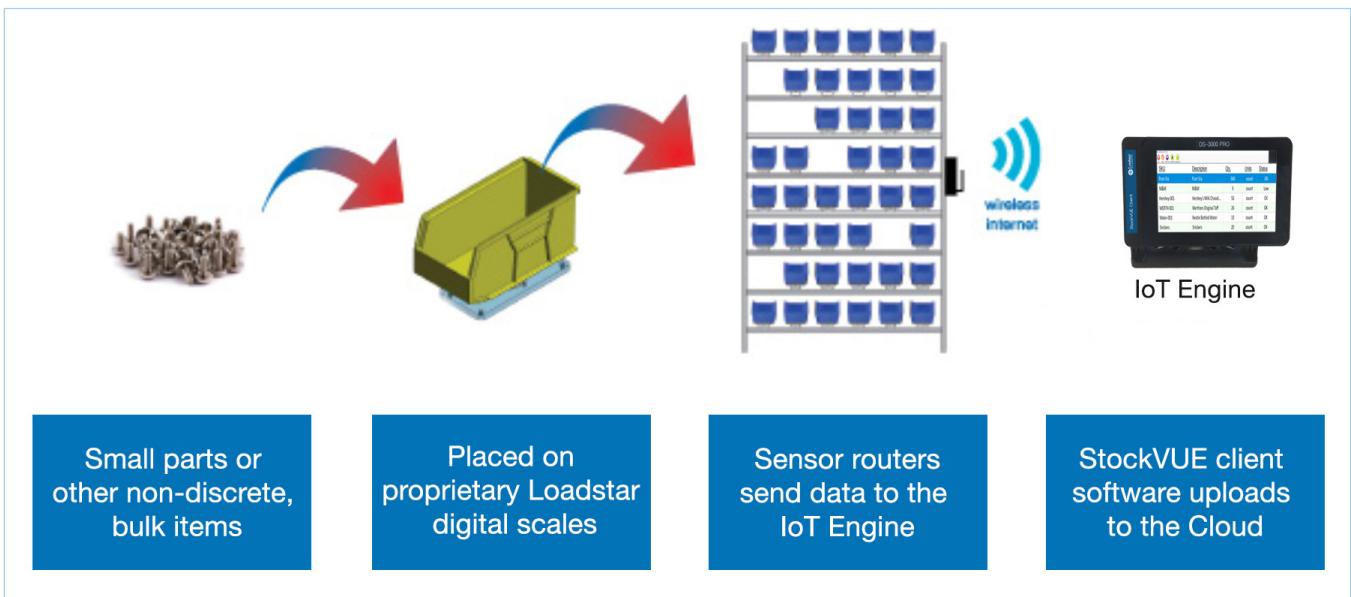
Software and Analytics

StockVUE Cloud software performs data analysis to compute inventory levels, generates alerts and provides real-time data access to system users.

HOW IT WORKS

The StockVUE Scales have a base and a platform so they can be placed on any type of rack or shelf system (wire mesh, particle board, metal frame etc.) in any combination. This allows users to flexibly place and use the scale in their current storage configurations without incurring additional cost for storage systems.

These digital scales continuously measure the weight of monitored inventory items. This weight data is fed to our routers which can handle up to twelve scales per device, and upload data wirelessly to an IoT Engine that then uploads information received from all connected routers to a secure Cloud-based server. The StockVUE Cloud application processes the data to calculate item counts and fill-levels. Designated users can access the processed information via any connected device, or StockVUE can send updates and alerts based on user-determined threshold levels or sudden changes in inventory (which could be indicative of theft or unusual activity). The StockVUE Cloud Solution allows customers to interface this data with ERP systems for new order creation, automatic replenishment and management reporting.



STOCKVUE ARCHITECTURE & INTEGRATION

Digital scales of varying capacities, sizes and configurations (single or multiple sensor scales) connect to sensor routers. The routers connect wirelessly to one IoT Engine on site. The IoT Engine can be based on a PC/Mac/ Raspberry Pi and run StockVUE Client software. The Client gathers all the data from all connected routers and scales and uploads information to a database in the Cloud. The StockVUE Web application provides remote visibility into this data as well as sends out alerts and alarms based on data analytics performed in the Cloud.



StockVUE Client: The StockVUE client polls the digital scales through the routers at regular intervals and uploads weight data to the StockVUE database in the Cloud.

StockVUE Web Application: Users can view inventory data anytime, anywhere and receive email or SMS alerts via an iPhone, iPad, Android Phone or other mobile devices with an Internet browser and Internet access.

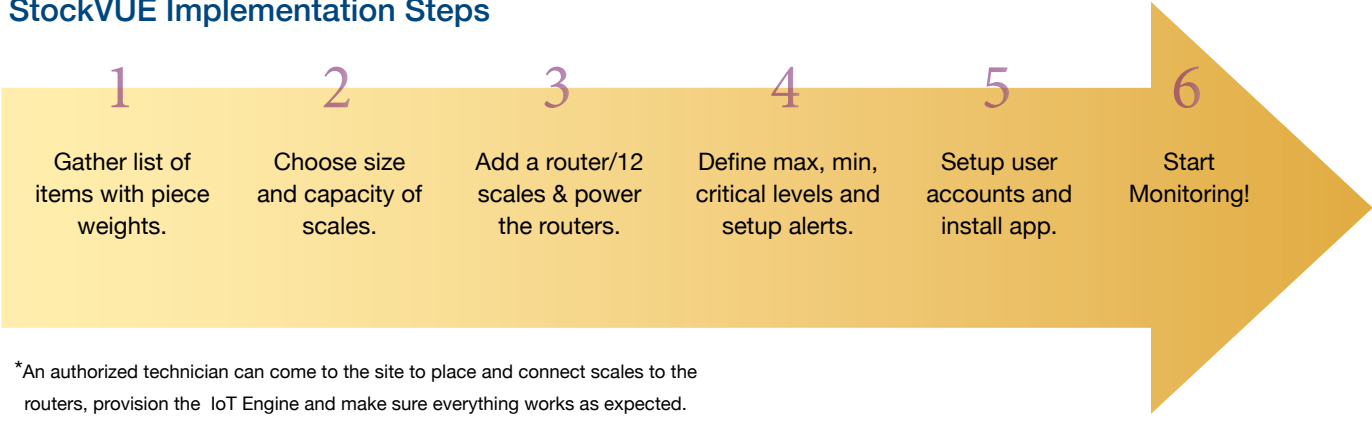
Best-in-Class Security: StockVUE continually updates its software to comply with global security best practices and thus ensure that user information is always safe and secure.

Systems Integration: StockVUE integrates with major ERP, MRP, WMS and CRM systems, including Oracle, Sales Force and SAP for order creation, replenishment and reporting. Alternatively, StockVUE can be used as a standalone solution.

StockVUE IMPLEMENTATION

Implementation of the StockVUE solution is straightforward and does not require extensive professional services (and the accompanying expenses). A small- or medium-sized site – perhaps a customer stockroom under a VMI contract with say 120 items – could be installed in four to five hours in the morning, and users could be on-line by the afternoon. A more complicated site – say an advanced assembly line involving several hundred to several thousand monitored items – might require several days with an authorized Loadstar technician on-site. In most cases, minimal user training is required: the StockVUE web application is easily accessed on a user’s own PC/Mac/Tablet/Phone via an Internet browser such as Chrome/IE/Safari. Customer team members can serve as the first level support for their own company and Loadstar Support will serve as the secondary support service for more advanced trouble shooting.

StockVUE Implementation Steps



*An authorized technician can come to the site to place and connect scales to the routers, provision the IoT Engine and make sure everything works as expected.

POTENTIAL APPLICATIONS

Manufacturers Inventory



Hospitals/ Assisted Living



Waste Pick-up Management



Water Management



Mail & Package Delivery



Retail Inventory Management



TESTIMONIALS



“StockVUE helps us avoid dangerous road trips to remote customer sites in the winter, just to take inventory. My area managers can handle ten times the volume now.”

Branch Manager
Industrial Parts Distributor



“It’s a VMI tool that finally makes JIT inventory management practical. It helps us realize JIT’s long-promised cost benefits & eliminate costly stock-outs to give us 10X ROI.”

CEO
Pharma Technology Provider



“On vacation recently, I checked in on my key customers and made several reorders, all from the beach and without my wife suspecting a thing!”

Regional Sales Manager
Healthcare Products Co.

BENEFITS

Real-Time Updates

Get up to the minute inventory data to make good decisions based on current information



Automatic Alerts & Messages

Send messages to appropriate personnel to avoid stock-outs and to send system alerts



Mobile Access

Get data from anywhere, anytime and on any Internet connected device



Software Integration

Merge data with existing ERP and Warehouse management solutions



Scalable Platform for Growth

Grow your business with a scalable, easy to deploy, low-cost inventory tracking solution



INVESTMENT CASE

StockVUE offers a clearly quantifiable return on investment (ROI) that makes it a compelling solution to invest in. Customers can either purchase the hardware outright or work with us to implement a per month leasing model.

Costs include:

- Hardware (Scales, Sensor Routers, IoT Engine, Cables, Backup Power Supplies etc.)
- Software (StockVUE Client, StockVUE Cloud Application)
- Support (24x365x7 Second Level Support)
- On site implementation and training if needed

Measurable benefits that lead to cost savings for customers include:

Efficiencies from fewer site visits <ul style="list-style-type: none"> • Reduced labor cost from time saved • Reduced vehicle depreciation and maintenance • Reduced insurance cost • Free up employees for more important tasks • Improve employee satisfaction & morale 	Efficiencies from streamlined operations & purchasing <ul style="list-style-type: none"> • Bulk discounts for consolidated purchases • No expedite fees due to Just in Time ordering • Eliminate periodic inventory counts • Reduced losses from theft and/or pilferage • Lower inventory carrying costs
Elimination of stock-outs and parts shortages <ul style="list-style-type: none"> • Fewer disruptions on assembly lines • Reduced penalties for VMI programs 	Improved customer satisfaction <ul style="list-style-type: none"> • Win more customers with better solution • Keep customers for life

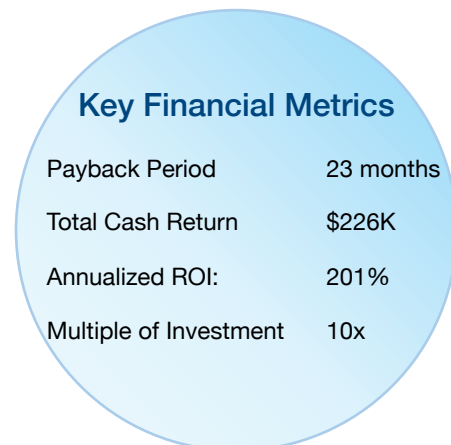
In most cases, a customer can make a compelling ROI with a payback of between one to two years and in most cases of about eighteen months.

ILLUSTRATIVE EXAMPLE – INDUSTRIAL PARTS DISTRIBUTOR, PER MONITORED SITE

Following is the ROI per deployed site for an industrial parts distributor whose regional managers are responsible for inventory monitoring and restocking at its customers' many manufacturing sites:

Upfront Expenses				
Scales (#)	Routers (#)	Hardware Expense	Installation Expense	Total Expenses
120	10	\$23K	\$2,000	\$25K

Productivity Gains				
Visits Reduced / Month	Manager Cost / Visit	Cost Savings / Month	Service Fee / Month	Net Site Savings/ Year
3	\$455	\$1365K	\$250	\$13.5K



(Note that this does not include additional benefits such as elimination of stock-out penalties under a VMI program, reduced inventory carrying costs, or increased customer satisfaction levels. Loadstar can work with your business to develop an ROI analysis customized for your specific StockVUE application.)

SUMMARY

StockVUE offers a cost-effective weight-based IoT solution for inventory management to eliminate stock-outs and provide remote visibility and automated replenishment. Due to its ease of implementation, integration with ERP systems and flexibility for customization, StockVUE can help anyone who needs to track and replenish inventory at remote locations, including manufacturers, distributors, retailers and service providers.



Loadstar Sensors is a leading provider of digital sensing solutions for force, load, weight, torque, impact, displacement, pressure and level measurement. Established in 2003 and headquartered in Fremont, CA, the company has over 10,000 customers in the aerospace, automotive, industrial, medical device, and test equipment sectors in over 80 countries around the world.

www.loadstarsensors.com



StockVUE

Loadstar's weight-based inventory management is protected by Patents:

6026694, 7047818, 7187185, 7343814, 7353713, 7451659, 905309, 7570065,
7644628, 7673530, 7743667, 7775130, 7897884, 200780011717.4, 7921728,
7980145, 8191428, 8174272, 8495263 and 8700828.

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