Making the Case for Wearable Tech in the Warehouse

RFgen

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Introduction

Over the past two decades, the manufacturing and distribution industries have benefitted from massive efficiency gains and cost reductions made possible through the evolution of industrial automation. After embracing barcoding and RFID, online commerce, and mobile technology, the industry is facing its next technological transformation—the Internet of Things (IoT) and all that it will enable, including wearable technology.

Wearable technology has already come a long way. Once considered science fiction, you can now buy a smart watch that rivals James Bond's—on Amazon. In spite of the rapid adoption of wearable technology by consumers, many businesses are still firming up their overall enterprise mobility strategy and just beginning to explore the idea of wearable tech for their more complex back-office workflows. Research firm Tractica predicts businesses will deploy 75 million wearables between 2014 and 2020[1], growing annual worldwide investment in enterprise wearables from $218 million in 2015 to $6.3 billion by 2020[2].

In this white paper, we'll explore the wearable tech world as it relates to warehouse management and supply chain operations. We'll take a look at what types of wearables are already in use in the warehouse today, how they're used, and what the future may deliver.

Research firm Tractica predicts businesses will deploy 75 million wearables between 2014 and 2020[1], growing annual worldwide investment in enterprise wearables from $218 million in 2015 to $6.3 billion by 2020[2].

1 Tractica, "More than 75 Million Wearable Devices to be Deployed in Enterprise and Industrial Environments by 2020," press release, April 8, 2015.
2 Tractica, "Enterprise Wearables Market to Reach $6.3 Billion by 2020," press release, October 15, 2015.

5 Key Drivers of Wearable Technology in the Warehouse

Wearables and the IoT will deliver the next iteration of efficiency gains in the enterprise. Just as warehouse workers learn to use barcode scanners and marvel that they ever used paper pick lists, wearables will empower employees to work more quickly and accurately than they believed they could. Already, wearable technologies such as ring scanners, smart glasses, and voice headsets are helping to improve the speed, accuracy, and safety of everyday tasks in the warehouse. The future of wearable technology will continue to integrate people and machines by combining real-time mobile data collection with augmented reality overlays.

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Speed

Wearables reduce warehouse transaction times significantly over barcode scanning alone. When you have to pick up your scanner, scan an item and/or bin, then set the scanner down again to pick or put away the item, it's considerably slower than completing the action in one fluid motion while having your hands and eyes free.

With a wearable device, you may only gain seconds per transaction, but in large distribution centers or manufacturing plants with hundreds of transactions each day, seconds add up to minutes and hours of increased throughput. Speed is a driver of efficiency in any operation, but it's especially important in industries where products must move quickly through the supply chain.

For instance, in the food and beverage industry where companies sell perishable products, wearable technology can help warehouse workers get orders out the door faster. As an example of the speed improvements possible with wearable technology in the warehouse, Dutch e-fulfillment company, Active Ants, equipped pickers with Google Glass smart glasses running a custom-developed application. The company observed 15% faster performance and 12% fewer errors in picking orders[3].

Accuracy

As shown above, in the Active Ants example, the need for better accuracy is another key driver of wearable technology in the warehouse. Wearables can improve accuracy as much as, or more than, barcode scanning. They are definitely more accurate than paper-based processes in the warehouse.

3 Erika Morphy, "Finally, Google Gets Glass. We Hope," Forbes, July 30, 2015.

Not all wearables offer the same level of accuracy and not all applications will operate with the same level of accuracy. This can be an area of concern when considering wearables for enterprise applications. Ring scanners would have the same accuracy as other mobile barcode scanners when it comes to scanning because they contain the same technology. But in other areas such as motion sensing, some wearables have been reported to be less accurate than other devices[4]. Smart glasses are an entirely new concept, so accuracy must be refined as the industry further defines the best uses for the technology in the warehouse.

Safety

Wearables reduce user fatigue and create fewer repetitive motions because workers do not have to pick up a scanner and set it down again. Using wearables, you are able to keep your eyes on your tasks and use both hands for greater control and safety. Wearable technology, combined with sensors around the warehouse, can help track the location of workers and equipment on the plant floor or warehouse, alerting to potential dangers. For example, a voice-enabled wearable could alert a forklift driver about the presence of an unseen worker around the corner to avoid a collision. Wearable technology can collect enough information to identify and analyze patterns that can help management identify areas where safety improvements may be needed, for example, unauthorized employees in the wrong areas or forklift operators who consistently drive too fast.

Using wearables, you are able to keep your eyes on your tasks and use both hands for greater control and safety.

Ease of Use

Wearable technology, running well-designed mobile applications, is easy to learn to use. Warehouse managers can reduce training time and associated costs when new workers come into the warehouse. Wearables deliver more intuitive interaction with employees. For example, it takes far less time to learn to respond with voice commands than to learn how to navigate a traditional software system using a screen and keyboard[5].

Better Management Decision Making

The IoT and wearable technology will enable management to collect far more information about how well the warehouse runs and make adjustments to optimize productivity and safety. Managers can monitor operations in real-time without being on the warehouse or production floor. During work hours, managers can know where their employees were at all times, giving them the ability to monitor breaks and make sure everyone is working to expectations. Wearable technology can also allow employees and managers to collaborate remotely between multiple business locations.

4 Emily Friedman, "Top Challenges of Wearables in the Workplace," BrainXchange, June 12, 2015.
5 Plex Manufacturing Systems, "Three Ways Wearables Will Change Manufacturing," CIO, September 9, 2015.

3 Enterprise Use Cases for Wearable Technology

Wearable technology will not be the best solution for every industrial warehouse application. There are still plenty of tasks where a handheld mobile barcode scanner or other mobile device works best and/or provides a superior return on investment. But there are already many uses for wearable technology in the enterprise, and with more technologies being invented all the time, use cases for wearable technology will expand rapidly.

Warehouse Operations

Workers benefit in many ways from being able to complete their tasks in a hands-free manner in the warehouse, whether supporting manufacturing operations in a warehouse or store-room or fulfilling customer orders inside a distribution center. Starting in receiving, workers are able to receive boxes, crates and pallets more quickly when they can work with both hands.

Wearable technology is extremely useful in pick and pack environments where workers pick small line item orders directly into shipping cartons. It's also helpful when you're case picking to a pallet and need to use both arms to lift large or heavy boxes. Hands-free technology can help avoid accidents when you are operating machinery, such as a fork truck. Finally, packing orders is faster with wearable technology as you can use both hands to fill and organize boxes or containers.

Examples: Read the Wearable Tech Spotlights on pages 5 and 10 to see how two distributors, Caito Foods and Myers Tire Supply, have deployed voice enablement and ring scanners in conjunction with mobile data collection for warehouse automation.

Transport and Logistics

For companies that transport goods and deliver packages, wearable technology that leaves the hands free is an obvious advantage. From sorting packages to loading and unloading trucks, ring scanners or voice enablement let employees move faster. Keeping your hands free makes it easier to handle large, irregular or heavy packages.

Examples: FedEx has long used ring scanners for package sortation, pickup and delivery[6]. DHL is piloting 'vision' picking; using augmented reality with location graphics displayed on smart glasses guiding staffers through the warehouse. So far, the company has enjoyed a 25% improvement in efficiency. At UPS, workers already use ring scanners, and the company anticipates that "new tools like digital eyewear and data gloves, combined with beacons and sensors, represent the next step in the evolution of how computing devices are deployed to improve supply chains[7].

Field Service

On service calls, field technicians need access to information that could include product service manuals, instructional videos, or even just a map with directions to the next service call location. Wearables can provide this information on site. Smart glasses can provide this information at the point of service, enabling technicians to view schematics or parts lists while simultaneously looking at the problem.

In the IoT, the first repair step for sensor-enabled products will be running remote diagnostics[8]. If the problem can be solved remotely, there will be no need to travel onsite, saving the technician time and the customer money. If onsite repair is required, a technician will arrive wearing smart glasses that deliver a guided diagnosis program. If there's still trouble, smart glasses enable the tech in the field to call a more experienced support professional in another location and stream video live.

6 Mary K. Pratt, "Wearables in the enterprise? Yes, really," ComputerWorld, February 24, 2016.
7 Rimas Kapeskas, "Wearable Tech: Shaping Logistics and the Smart Warehouse of the Future," Longitudes, September 23, 2015.
8 Chris Curran and Bob McCutcheon, "Field service workers could fix wearables' PR problem," pwc blog, March 23, 2015.

This allows senior-level support to diagnose problems and share solutions with multiple technicians in the field—effectively helping out in many places nearly at once. Depending on the integration between the wearable and back-office systems, the technician may even be able to place an order for parts from the field.

Example: Lee Company provides plumbing, electrical and other building services for both home and commercial purposes[9]. The company has deployed about 500 smart glasses from Vuzix paired with custom applications from XOEye. The smart glasses enable onsite technicians to involve senior technicians in service while leaving the onsite technicians' hands free to perform repairs. The data collected at each job is integrated with Lee Company's client service platform, enabling the company and its clients to track service records.

9 Mary K. Pratt, "Wearables in the enterprise? Yes, really," ComputerWorld, February 24, 2016.

Wearable Tech Spotlight: Voice Enablement

Company: Caito Foods
U.S. Headquarters: Indianapolis, Indiana
Products: Fresh Produce Distribution

Challenge: Caito Foods operates four distribution centers that send fresh produce to multiple states. Caito Foods used a paper-based system in their distribution warehouses to track products delivered to their customers. Going through the paperwork took too long in the event of a food recall and was not precise enough to pinpoint only the contaminated lots, so the company would have to destroy good food with bad. In terms of picking products for customer orders, Caito Foods wanted to improve efficiency and throughput to get the fresh produce picked and out the door as soon as possible.

Solution: Caito Foods implemented RFgen Mobile Foundations for Oracle's JD Edwards EnterpriseOne for Warehouse Management, Inventory Management, and Purchase Order Processing. Caito Foods also implemented RFgen's License Plating Solution to help create accurate, traceable transactions throughout the warehouse and the RFgen-Vocollect Voice Solution for voice-directed picking.

Results: RFgen has dramatically improved the efficiency of Caito Food's warehouses. Using the RFgen-Vocollect Voice Solution has enabled Caito Foods to:

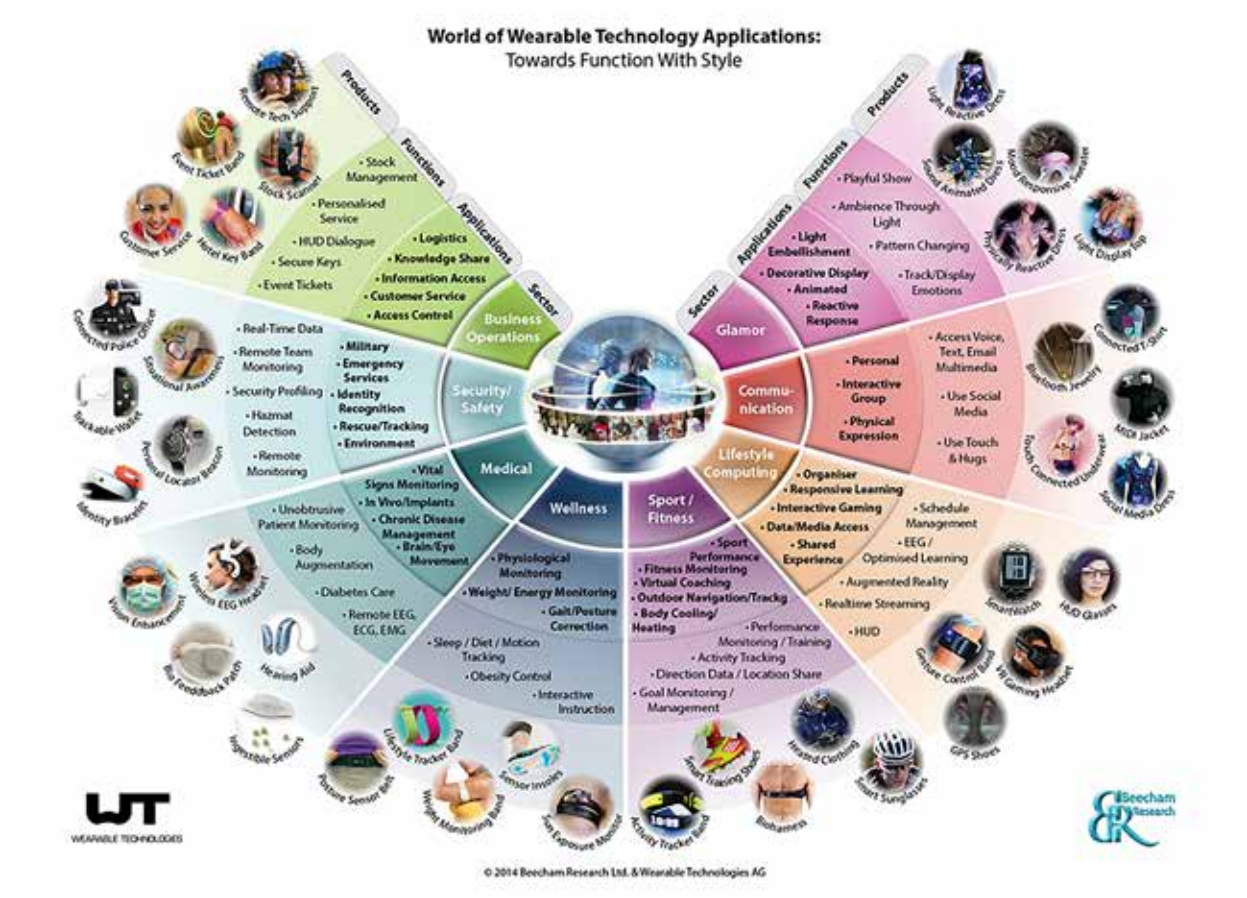
- Trace produce from suppliers throughout internal operations and on to grocery retailers.
- Improve the efficiency of receiving, put away and inventory replenishment processes.
- Fully automate intercompany branch transfers, saving time and reducing paperwork.
- Speed up picking and shipping with voice picking.
- Reduce the learning curve for new workers from three months to just three weeks.
- Improve warehouse analytics to better identify trends.

"One of the main reasons we decided to move to voice picking is that we create pallets as we pick; we don't stage. Our pickers need to have both hands free."

~ Cindy Garrett
Director of IT
Caito Foods

Finding the Right Wearable for the Job

It's clear that wearable technology has a big future in the warehouse. There is a lot of wearable technology coming into the market place, and most new innovation is focused on consumers, with splashy launches for products such as the Apple Watch and Google Glass. Many of these products could have a commercial use but will need some adjustments for the rugged working environment of a warehouse, plus development of the right mobile applications to drive the human-computer interaction.



What Features Make a Wearable Appropriate for Warehouse Use?

As you know, the warehouse can be an extreme environment. Anything used in the warehouse has to stand up to heavy use, possible drops and temperature variations. For this reason, many manufacturers and distributors are forgoing the consumer versions of wearable devices and waiting for more industrial models to be developed.

Here are some of the features that adapt a wearable to warehouse use:[10]

- **Durable construction** – rugged enough to withstand bumping and dropping, as well as large variations in moisture and temperature
- **Ergonomic** – does not cause discomfort if used for an entire shift
- **Design** – able to quickly put it on and take it off (don and doff), fits a wide variety of people, can be used left or right handed
- **Hygienic** – easy to clean between users
- **Display** – easily viewed in both bright sunlight and dim corners of the warehouse
- **Keypad** – good spacing between keys or buttons and backlit for low light conditions
- **Speed** – responsive in tasks like scanning or lookups
- **Noise cancellation** – filters out forklift beeps, fans and other warehouse noises[11]
- **Applications** – integration between wearable devices and your existing back-office systems and warehouse workflows

10 Motorola white paper, "Selecting the wearable that will deliver maximum value in your enterprise environment."
11 Honeywell Vocollect Voice website.

3 Most Popular Wearables Today and What's Coming

Let's review the three most popular types of wearable technology used in warehouses today, as well as a few up and coming technologies that you may see more of in the future.

Ring & Glove Scanners

Ring or glove scanners put barcode scanning at the tips of your fingers, without filling your hands. A ring scanner fits comfortably on your finger and is connected to a mobile computer worn on an arm band through either a cord that runs up the hand and arm or wirelessly through a Bluetooth connection. To scan a barcode, you simply point at it. They are ruggedized and ergonomic and can be shared easily between different employees.

According to Honeywell, scanning with a Bluetooth-enabled ring scanner is 10-15% more productive than using a tethered scanner.[12]

Ring scanners save time and reduce repetitive motion. You never have to pick up or put down your scanner, because your hands are free for your work. You retain your full range of motion while wearing a ring scanner. Affordable ring scanners are manufactured by Honeywell and Zebra. According to Honeywell, scanning with a Bluetooth-enabled ring scanner is 10-15% more productive than using a tethered scanner.[12]

Another wearable hand scanner is the KOAMTAC KDC Finger Trigger Glove. It's an ergonomic glove that empowers point-and-scan functionality and can be connected via Bluetooth to popular smart phone devices.[13]

12 Honeywell 8650 Bluetooth Ring Scanner data sheet
13 Kayla Matthews, "Wearable Tech Starting to Be Used in Warehouses," TechAcute blog, October 13, 2015.

Voice Enablement

A voice-enabled headset and wearable computer is useful for any workflow where having your hands and eyes completely free will help you work more effectively and safely. Several companies offer industrial wearable solutions for voice enablement, including Honeywell Vocollect Voice and Zebra RCH51 (formerly Motorola).

Benefits of voice enablement in the warehouse include up to 20% faster warehouse transactions, such as picking, as you work at the speed of voice which is faster than typing or scanning.[14] Voice leads to smoother, more fluid workflows, because you listen to the order as you're working, rather than reading a screen, picking up the scanner and sequentially executing the task. Voice reduces errors using voice over any manual data entry process and increase safety as workers look up and use both hands work with items.

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Smart Glasses

Smart glasses can create a rich user interface that combines wearable glasses with voice enablement. Workers interact with the glasses through voice commands and have their hands free at all times. There are really two types of smart glasses—monocular glasses, such as Google Glass and some models of Vuzix Smart Glasses which are already being utilized in warehouse operations, and immersive glasses (which we'll discuss in the next section) that are evolving to create a rich "augmented reality."[15]

14 Honeywell Vocollect product information.
15 Oracle, "JD Edwards EnterpriseOne Wearable Technology," white paper, May 2015.

Monocular smart glasses deliver a number of useful features for warehouse, shop floor and field service, including the ability to scan barcodes, take photos, stream live video, and display information or commands on the glass for the wearer. Smart glasses can be worn comfortably for a full shift without having to recharge the battery, and they can include built-in speakers and a microphone to incorporate voice enablement.[16]

For enterprise use, many companies remain on the fence about smart glasses. In a recent survey by PLEX Systems, 35% of manufacturers thought that smart glasses are 'overhyped,' while 35% said they will likely incorporate them into operations within five years.[17] Some key considerations may be whether your application for the smart glasses would require them to be made of safety glass and how many of your workers require prescription eyewear (which could preclude sharing the smart glasses between employees).

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Other Wearables May Present Future Opportunities

In addition to ring scanners, voice enablement, and smart glasses, here are some other wearable technologies that are likely to make future appearances in the warehouse:

- **Safety Vests** with location sensors will be used in combination with other wearables to locate workers in real-time in the warehouse, in order to avoid accidents between equipment and people. These vests could be embedded with a variety of other sensors to keep workers safe, for example, 'sniffer' sensors to detect dangerous gases or chemicals.[18]
- **Interactive Braces** will help warehouse workers learn how to avoid strained muscles and back problems. Kinetic has developed a high-tech back brace that detects when you're performing a lift and which muscles you're using. It provides real-time feedback through a wristband to let you know whether you made the lift safely or unsafely.[19]
- **Augmented Reality Systems** overlay what you see and what you touch with additional virtual reality. These highly advanced systems are already being used in some high-tech warehouse and manufacturing environments. In addition to advanced software applications, augmented reality systems might include:

16 Damir Kantardzic, "Wearable Technology in the Warehouse: Picking with Vuzix Smart Glasses," Bastion Solutions blog, March 10, 2015.
17 Jason Prater, "3 ways wearables in manufacturing will transform shop floors," Diginomica blog, July 22, 2015.
18 PLEX, "Shop Floor Safety Can Improve with Wearable Technology," CIO, May 20, 2015.
19 Klint Finley, "The Internet of Anything: This Wearable Could Keep You From Throwing Out Your Back," Wired, February 23, 2015.

  - **Immersive Smart Glasses** overlay rich contextual information into your field of view. This goes far beyond the traditional smart glasses capabilities of taking still photos, streaming video, and receiving stored information. For example, rather than being told to look for bin five on aisle six, you'd simply be directed to aisle six and bin five would have a big flashing green box over it.[20] These smart glasses might also include a gesture recognition engine that could interpret the wearer's head or hand gestures.[21]
  - **Data (or Haptic) Gloves** sense when you're picking things up and can identify items by characteristics. In the future, the gloves might also be able to let you make gestures with your hands for certain commands.
  - **Voice enablement** to allow you to communicate with the system and other employees in collaboration.
- **Smart Watches** can be used to provide alerts to employees and monitor safety conditions.
- **Armbands** may enable warehouse and manufacturing employees to use simple hand gestures to interact with back-office systems (similar to one of the concepts for haptic gloves). According to Oracle, "Natural human gestures like squeezing your fist, spreading your fingers, waving left or right, or rotating your arm can be easily mapped to interactions on a desktop or mobile device thus allowing for non-touch interaction with existing applications and devices. These devices have many interesting applications in shop floor operations, industrial manufacturing, healthcare and other domains."[22]
- **Wristbands** can provide simple, cost-effective, real-time location of every employee in a warehouse or on the shop floor. Some companies are experimenting with using these to automatically check in/check out workers from their work stations. For example, in some call centers, wristbands indicate when a representative is away from his or her desk, and automatically places them on break status and redirects calls to other representatives.[23]

20 Oracle, "JD Edwards EnterpriseOne Wearable Technology," white paper, May 2015.
21 Jason Prater, "3 ways wearables in manufacturing will transform shop floors," Diginomica blog, July 22, 2015.
22 Oracle, "JD Edwards EnterpriseOne Wearable Technology," white paper, May 2015.
23 Scott McCormick, "Four Use Cases for Enterprise Wearable Technology," FLOAT blog, November 2, 2015.

Wearable Tech Spotlight: Ring Scanners

Company: Myers Tire Supply
U.S. Headquarters: Akron, Ohio
Products: Tire and wheel service tools, equipment, and supplies

Challenge: Myers Tire Supply provides just-in-time resupply for tire repair shops. The company buys and sells nearly 10,000 different tools, equipment and supplies for tire, wheel and under-vehicle service. Many parts are very small, and about 90% of orders are filled as small parcels. Prior to 2015, Myers Tire Supply lacked automation in its warehouse and management wanted to improve the speed and accuracy of picking operations.

Solution: Myers Tire Supply automated data collection with RFgen Mobile Foundations for Oracle's JD Edwards World and deployed a combination of traditional mobile barcode scanners along with Zebra (formerly Motorola) ring scanners and wearable mobile computer devices. RFgen Mobile Foundations for Oracle's JD Edwards is a suite of pre-written, pre-tested Oracle-validated data collection solutions that enable enterprises to benefit from real-time barcode data collection, voice-integrated workflows, and roaming mobile applications.

Results: With ring scanners and RFgen, Myers Tire Supply transformed from zero automation to full automation in picking operations. Workers wear a small ring band on their hands that pairs with a mobile device worn on their forearms. To scan, a worker simply points the ring scanner at the barcode and can move down a row of bins very quickly. RFgen collects the data and sends it automatically to the ERP system. Whether workers are using a traditional scanner or a ring scanner, they see the same screen displayed by RFgen, so tasks feel completely consistent regardless of device. The screen on the mobile device displays the same screen as RFgen on other devices.

With RFgen and ring scanners, workers save time by:

- Picking lots of small parts quickly by simply pointing to scan.
- Avoiding the repetitive strain of picking up and putting down a scanner gun for each item picked.
- Picking up to seven small parcel orders together on one cart by creating a license plate for each batch, with task numbers that help easily sort on the pick, avoiding the need for a consolidation area.

"We do a lot of small parts picking, so hands-free picking is critical for us. As I investigated the possibilities of deploying wearables with RFgen, ring scanners were the best first step for us. We may add voice automation later, and with RFgen, we could do that easily, at any time. In retrospect, now that I see how well wearables work for us, I think having a few more instead of traditional scanners would have been beneficial."

~ Paul Nonno
Manager of Distribution Operations
Myers Tire Supply

Extending Your Oracle ERP System to Wearable Devices

As with other mobile devices used in the warehouse, wearable technology needs to be fully integrated with your ERP system. Mobile data collection software can provide validated connectivity between your ERP system and any wearable technology you equip your warehouse workers with, as well as traditional warehouse devices such as barcode scanners and printers. Empower your team with real-time wireless, roaming mobile and voice-enabled applications to optimize warehouse operations.

Enterprise mobility solutions can help you integrate wearable technology with your back-office systems. We recommend you choose a mobile data collection software solution that:

- Has validated integration to your ERP system.
- Provides you the option of on-premise or cloud, connected or disconnected solutions.
- Allows you to connect your ERP system to any hardware device.
- Can be quickly implemented.
- Gives you the option to create or modify your own mobile apps on an in-house basis.

The IoT is opening up many new options in warehouse automation, including the use of wearable technology. Ring scanners, voice headsets, and smart glasses are gaining in popularity among warehouse managers, and these technologies are only the tip of the iceberg. Over the next decade, you should be prepared for a major transformation in warehouse operations, driven by the IoT's easy ability to collect, analyze and share information. Combined with the right mobile software applications, wearables will take your warehouse to a new level of productivity and help you make important gains in warehouse safety.

RFgen Software—The Mobile Data Collection Experts

RFgen Software helps organizations reduce supply chain implementation costs and increase accuracy and efficiency with the industry's most reliable and flexible wireless and mobile automated data collection (ADC) software and open source supply chain solutions.

In business since 1983, RFgen is known in the manufacturing and distribution industry for its solid, high-quality products and high customer satisfaction ratings among its more than 2,800 customers. With a global reach and local touch, RFgen and its network of more than 140 certified solution partners can service and support your organization no matter where you're operations are located around the world.

Using RFgen, businesses are able to quickly take their current manual processes and turn them into real-time mobile applications using barcoding, RFID, mobile and voice technologies. RFgen's Mobile Foundation Suites accelerate the integration of mobile and barcoding technologies into your environment providing certified solutions that can simplify existing processes as well as combine multiple ERP operations into an optimized workflow.

Whether you are looking for solutions to automate your warehouse and better manage your inventory, comply with government regulations, ensure 24/7 warehouse operations, track and trace your products, voice-enable your warehouse, or manage your remote inventory, RFgen is the smart choice.

To learn more, please call us at 888-426-2286, or visit our website at: www.RFgen.com.

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