In the Summer of 2004, JDS Professional Services completed the installation of a groundbreaking new RFID asset tracking solution for pH Europe Ltd. featuring the TAVIS™ data management platform.

Background

pH Europe Ltd. is an innovative container supply company based in the county of West Yorkshire in the UK. Its Huddersfield headquarters can be found a short drive east of the industrial metropolis of Manchester, in a region commonly credited as being the birthplace of the Industrial Revolution.

During the Victorian era of the early 1800s, Manchester and its surrounding mill towns became vital hubs of commerce and trade, with particular significance in textile industries. The spinning, dyeing, and weaving of cotton during this period by large communities of workers allowed raw material processors and commercial distribution networks to flourish and grow within the region. With a ready transportation infrastructure of canals, streets and emerging railway services, Manchester was soon seen as the Warehouse of the Western World.

Today, it is not surprising to find forward thinking transportation, logistics and manufacturing companies here. They build on a legacy of supply chains past while leveraging the intellectual base of knowledge that is almost organic in the region after 200 years of development.

pH Europe’s contribution to this legacy is in the flexible nature of its container sales and rental service, and in its use of technology to optimize the efficiency of its operations.

The company has found great success in offering a portfolio of transport container and asset tracking services designed around a wide range of secure containers. Among these are long-life intermediate bulk containers (IBCs), folding pallet containers (FPCs), plastic boxes and environmental storage units. A growing roster of clients use its services to transport an array of goods ranging from chemicals to pharmaceuticals, foodstuffs to industrial parts; supported by comprehensive fleet maintenance and tracking. Clients such as GSK, Sun Chemical, Avecia, Johnson Matthey, AllessaChemie, Methode and AH Marks also appreciate the extensive storage, repacking and cleaning options that further enhance the value of their relationship with pH Europe.
that embraces new technology and rises to meet the challenges of an industry in transition. Their container business falls into three distinct product areas: stainless-steel containers, plastic containers and environmental storage products. Many of their new customers are finding that renting containers can provide an immediate boost to the balance sheet. By retaining the services of pH Europe, they are able to accommodate spikes in product demand even while their owned inventory of containers is devoted to other shipments; either in storage or en route. With an impressive arsenal of containers available for rent (or for hire in the King’s English), pH Europe can meet increases in demand with a solution set that is reactive, cost effective and efficient.

Once exposed to the pH Europe portfolio during a busy period or in a crisis situation, companies tend to become interested in taking advantage of its products and services on a more ongoing basis.

The Challenge: Increasing Visibility

The company’s initial launch of rental IBC containers in 1996 was a departure from the traditional way of doing business in the transport container field. While a new concept at the time, pH Europe’s services were quick to catch on with businesses that were embracing new supply chain efficiencies within their own organizations.

Coinciding with the rise of installed Warehouse Management Systems (WMS) in its target markets, the principals at pH Europe began investigating the potential for tracking and monitoring each of their IBCs throughout the rental cycle. Beginning in 2002, they also realized that tracking features could add value to their existing rental business and perhaps generate new interest among mission critical shippers. The ability to offer Real Time Location Services (RTLS) to producers of flamma-
ble chemical, combustible liquids and other hazardous materials also piqued their interest.

Conversations with the Dean of the School of the Built and Natural Environment at Glasgow Caledonian University in Scotland led to the formal application, and subsequent award, of a government grant to pursue the development of a wireless tracking solution. The Knowledge Transfer Partnership (KTP) with the university was part of a UK Government program that enables firms of all types to collaborate with knowledge base organizations and research institutions on business technology challenges and opportunities.

Shortly after pH Europe was awarded the KTP grant, a search was conducted to qualify a top prospect from the university ranks to lead the development team. Dr. Ivelina Ivanova was establishing her expertise in supply chain management and logistics at the time, and turned out to be the perfect candidate. Her understanding of supply chain research methods and enterprise resource planning proved invaluable as the project got underway. Dr. Ivanova, who now serves as the RF project leader at pH Europe, was able to help the company quantify its needs and select the appropriate technology.

During the initial planning phase it was determined that a GPS solution would provide the necessary location functionality, but would prove far too expensive in the long run. The fact that GPS tags would also need their batteries recharged on a frequent basis was a non-starter for the project. The evolving realization that a hybrid RFID/GPS solution featuring long range active RFID technology at the container level, and GPS at the truck level introduced a new series of complexities that would have to be solved by an advanced data management software system.

### HARDWARE REQUIREMENTS:

- Inexpensive, long-life active RFID tags.
- Easily replaceable tag batteries.
- Configurable tag read range (up to 100 meters).
- Device diagnostics included.
- Fixed-position and handheld reader compatibility.
- Choice between attended and hands-off operation.
- Must use (ETSI-approved) frequency at 433 MHz.
- Compatibility with barcode and GPS.
- Tags must send data pulse every 2 seconds, (so that two reads occur within 5 seconds).

### SOFTWARE REQUIREMENTS:

- Real-time data flow.
- Customizable report functionality.
- Data must be accessible by all network users.
- System to incorporate RTLS and asset data.
- Historical data must be easily accessible.
- Built-in trend analysis and KPI monitoring.
- Easy integration with existing management information systems.
The Solution: Hybrid RFID Management

After an exhaustive evaluation of long range RFID tag vendors in the U.K., and later in North America, it was determined that the cost and functionality of only one vendor’s tags would meet their requirements. The Mantis™ series of tags and readers from RF Code Inc. offered the winning combination of range, price and performance. The Mantis tags featured a five year battery life and price-to-performance ratio that was unmatched in the industry.

RF Code’s data management software solution would be used to connect, collect, consolidate and filter the tag data from the various containers, and integrate third party applications as well as GPS data.

The TAVIS data management platform from RF Code was only paired with its Mantis brand of active RFID tags and readers at the time of pH Europe’s market evaluation. (In October 2003 the company announced that it would offer TAVIS as a standalone solution for hybrid Auto-ID and EPC/RFID applications).

The TAVIS software platform is an Auto-ID data management framework which supports a broad spectrum of Auto-ID devices for data collection, filtering and consolidation. It also serves as an application bridge to many of the world’s leading information systems. As TAVIS-powered solutions enable device-independent data collection from a wide variety of devices, they can accommodate active RFID readers, passive RFID readers, EPC readers, remote sensors, barcode scanners, Wi-Fi® access points and GPS receivers.

During negotiations with RF Code, it was decided that Burlington, MA-based JDS Professional Services would handle the integration of the system and contribute its CALTS™ asset tracking suite. JDS is part of the JE Consulting group of companies, whose expertise in implementing active and passive RFID technologies is supported by dealer networks serving China, Hong Kong, Macau, and Taiwan in addition to their presence in Europe.

CALTS is a software suite built on the TAVIS platform that leverages the collected RFID data by way of a powerful graphical interface and mapping capabilities. In the case of the pH Europe implementation, it was chosen to track the movement of the company’s IBCs in real time and provide sophisticated rental visibility and reporting features. Paired with the CALTS Spatial Data Engine (SDE), it would be empowered to translate raw TAVIS data into X,Y and Z spatial coordinates.

JDS president John Hawkins had established a strong relationship with RF Code prior to his firm being brought on to join the project. He was particularly impressed with his first exposure to the Linux version of TAVIS, since much of his company’s work is in China where Linux is often required. JDS principals were experienced in the European market and were able to optimize the resources available from Dr. Ivanova and the pH Europe team.

For the pH Europe implementation, JDS recommended Microsoft SQL Server 2000 and the .NET framework in order to reduce the total cost of ownership (TCO) and enable an easy setup process. The combination of SQL Server and TAVIS was also seen as a highly scalable proposition that would allow pH Europe to quickly expand and add native language functionality as they acquired new customers throughout Europe, and beyond. It was important to keep support costs down and ensure that multiple versions of the software weren’t necessary to add functionality or plug in modules.

The Result

After several months of installation and testing procedures, the TAVIS-powered solution was formally unveiled in August 2004. As a result, pH Europe was
able to establish a fully automated check out process.

Now, as trucks are loaded with IBCs, the administrators at pH Europe receive real-time, positive verification of the load immediately. Each truck moves through an automated check out that is completed in less than five seconds as it leaves pH Europe property. In the time it takes to drive through the gate, all assets are accounted for --- even on a fully loaded truck carrying 44 IBCs!

Each container is related to the truck for tracking purposes, and the truck’s GPS data is used to track each load. With the device-independent nature of the system, each IBC can be individually accounted for with short-range handheld readers upon delivery or automatically processed if the destination site also employs an RFID solution. Tag readers from Alien, Matrics, Texas Instruments and more are fully supported by the system. The team at pH Europe can even monitor a delivered IBC’s location from their centrally managed control station.

Since the TAVIS-powered solution was brought on line, it has enabled each IBC to generate maximum revenue for the company. The pH Europe inventory does not sit idle due to being in the wrong place at the wrong time. Once rented, each container is prepped and ready to be put into service before the trucks even arrive. And after trucks arrive, the IBCs are quickly on their way without the need for human interaction beyond physically loading them.

Hazardous materials, dangerous chemicals and highly regulated liquids can be matched with their own individual safety data sheets at the time they are rented. In this way their properties and characteristics can be recorded and readily available in a variety of formats from data included on the tag.

Secondary Benefits

The flexibility and scalability of the new system will not be fully taxed even as pH Europe and their customers make new demands of it.

Beyond recognizing the benefits in their own supply chain, pH Europe will market the tracking service to their own customers. It is branded Finder™ by the company, and will be provided as a line item service option on each rental agreement and will also be extended to include non-container assets as well.

As their customers install local RFID systems in their warehouse and stockyard facilities, a completely automated and fully visible environment will evolve.

Already customers are inquiring about advanced functionality. A food processing company is interested in monitoring the temperature of meat while in transit. A chemical company is interested in motion detection and tamper-proof applications. Another client wants to investigate read/write tags for associating new data directly on the tag while in the field.

With TAVIS as the platform powering the Finder offering, pH Europe will be able to incorporate new customer requests, add additional Auto-ID devices and even support EPC-compliant pallets of tagged RFID products as demand warrants.

The new industrial supply chain revolution is well underway in West Yorkshire.
The benefits realized by integrating RFID location and tracking to enhance supply chain visibility were summarized by pH Europe Ltd. as follows:

**Improved Asset Utilization** – through better visibility of what is currently available in the warehouse and easily accessible trends in customer demand. We are now able to plan ahead for the utilization of a particular asset and build schedules for its use.

**Pricing Flexibility and Activity-Based Billing** – we are now more flexible in the way we bill our customers, which improves the service we provide to them.

**Reduced Labor Expenditures** – this is the main advantage of the system in that all the data is updated automatically, without the need for human input. This results in much more accurate data.

**Reduced Breakage and Loss** – this is the indirect effect of the system, achieved through better asset control and being able to identify (and bill) those customers who are responsible for the loss or damage of containers.

**Improved Service Quality** – it comes from better planning of container usage, accurate information about the availability of assets, greater flexibility in pricing and delivery and the ability to provide real-time proof of missing containers.

**Reduced Transportation Costs** – through better planning of the container usage, we are now able to schedule transportation more efficiently.

**Better Understanding of the Customer and Their Operations** – though the availability of reliable reports and trends in container usage by a particular customer.

**Increased Competitive Edge** – through reliable real time data, we are now a step ahead of our competition in the way we record and monitor the movement of our containers.

The **TAVIS-Powered** RFID solution deployed by pH Europe, Ltd. in the Summer of 2004 was recently honored as an IM2004 Awards Finalist in the **Supply Chain** category.

The **Information Management Awards** are the premier European recognition of excellence and innovation in the management of business information.
Software:

- **TAVIS** (version 2.1) Data Management Platform from RF Code.
- **CALTS** (version 1.1) Real-Time Asset Tracking Suite from JDS.
- **CALTS CMM** (Client Management Module) from JDS.
- **CALTS SDE** (version 2.1) Spatial Data Engine from JDS.
- Microsoft **.NET Framework** version 1.1
- Microsoft **SQL Server 2000**.
- **Crystal Reports** for Visual Studio .NET
- Custom pH Europe **Finder** user interface.

Hardware:

- 802.11b WLAN hardware from D-Link.
- **Mantis II** Active RFID readers (ETSI-compliant 433 MHz) from RF Code.
- **Mantis** Active RFID Tags (ETSI-compliant 433 MHz) from RF Code.
- Low power PC server, (Intel Celeron with 378 MB RAM).
- Notebook computer (Intel Centrino) for warehouse reporting and customer demonstrations.