Real-time Asset Management for Railroad Freight: The RFTrax Opportunity

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Spring 2006

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Executive Summary

The railroad industry is now at a crossroads that impacts not just the railroad operators, but also the manufacturers and shippers that depend on rail transportation to deliver spare parts and finished goods across the continent. The renaissance of the railroad as a key element in the freight transportation infrastructure has highlighted the need to better manage the transportation of goods by rail.

At issue is an on-going problem: The state-of-the-art in tracking and managing key rolling assets – railcars, tankers, and locomotives – lags far behind other highly capitalized, mission-critical industries. Loss and damage as a percent of revenue have remained largely unchanged in the industry in 20 years, while just-in-time requirements have significantly increased the number of freight cars in use, even as overall dwell times have gone up for most operators. Security is another concern: the 1.7 million hazmat shipments sent by rail each year are largely unmonitored, despite increasing calls for the industry to improve its security profile. Fuel prices and faster time-to-market requirements are also driving a need to better manage the 1.6 million railcars in use in the United States.

An important model for improving the management of railroad assets can be seen by looking at the efficiencies that manufacturers have been able to achieve by marrying shop floor, or MES, data with their back-office ERP systems. The return on investment at this level of integration has been significant for manufacturers. Similarly, tapping into data at the boxcar, tanker, and locomotive level concerning loading, transit, and unloading, could provide a wealth of information similar to the information that MES systems have traditionally provided to manufacturers. Integrating those data with ERP and equivalent systems could provide a windfall of information for improving the efficiency and profitability for all concerned.

RFTrax is seeking to solve these problems with a combination of hardware and software that delivers a real-time solution for information access and asset management for three major constituents: railroads, shippers, and manufacturers that own and manage a fleet of railcars. The design and deployment scenarios for the RFTrax solution show a relatively low-cost and highly extensible model for bringing the value of railcar data to bear in lowering costs and improving service for all stakeholders in the rail freight industry.

Introduction: The Information Gap in Railroad Asset Management

The railroad industry, newly profitable and newly positioned to take back market share from the trucking industry, is now at a crossroads that impacts not just the railroad operators, but also the manufacturers and shippers that depend on rail transportation to deliver spare parts and finished goods across the continent. The renaissance of the railroad as a key element in the freight transportation infrastructure has highlighted the need to better manage the transportation of goods by rail. As rail freight becomes the linchpin in complex support chain operations, such as just-in-time manufacturing for the automotive, high-technology, and chemical industries, new efficiencies are needed to help sustain the momentum for all involved.

At issue is an on-going problem that no amount of positive news can erase: The state-of-the-art in tracking and managing key rolling assets – railcars, tankers, and locomotives – lags far behind other highly capitalized, mission-critical industries. This lack of cost-effective solutions for tracking the location and status of these assets, in real-time, across the more than 200,000 miles of track and siding in North America, represents an extraordinary information gap.

One impact of that gap is the fact that loss and damage as a percent of revenue have remained largely unchanged in the industry in 20 years, despite recent revenue gains across the industry. Another is that just-in-time requirements have significantly increased the number of freight cars in use even as overall dwell times – the amount of time a car is sitting in an active yard and therefore not in transit – have gone up for most operators, signaling on-going inefficiencies. Security is another concern: the 1.7 million hazmat shipments sent by rail each year are largely unmonitored, despite increasing calls for the industry to improve its security profile. Moreover, with rising fuel prices and faster time-to-market requirements, not knowing the real-time location and status of the 1.6 million railcars in use in the United States is an important barrier to achieving improved efficiency and lowered costs.

RFTrax, Inc., a wholly owned subsidiary of Fairfield Industries, based in Sugar Land, Texas, is tackling this rolling asset management problem with a unique hardware and software solution that promises to dramatically improve the ability of railroad operators, shippers, and their customers to eliminate waste and drive greater efficiency. Enterprise Applications Consulting has taken an early look at the company's offering in order to assess its value to these key stakeholders. EAC's review shows a well-designed solution that is arriving at a critical juncture in the rail freight

industry. This solution could serve to have the same broad impact for railroad shipping that improved manufacturing shop floor systems had on overall manufacturing efficiency and competitiveness – i.e. improved service delivery, maintenance costs, operations, and profits. While RFTrax is still in the early stages of its roll-out, EAC's review of the company, its products, and the market opportunity, reveal a solution that promises to have a major impact on how success is measured in the railroad freight industry.

The State of the Industry and the Need for Real-time Status and Tracking Information

As the rail freight industry continues to grow in importance and scope, the requirement for developing more robust and comprehensive freight management systems is becoming increasingly imperative. The growth in the use of rail freight is well-documented: Class I railroads shipped some one trillion ton-miles in 1990; by 2003 that number had grown to almost 1.60 trillion. Two years later, in 2005, total freight volume reached 1.69 trillion, up 2.4 percent from the previous year. Revenues have largely increased as well: Growth rates have ranged from 5 to 19 percent in the last year, and profitability has returned to a sector that has struggled for a number of years.

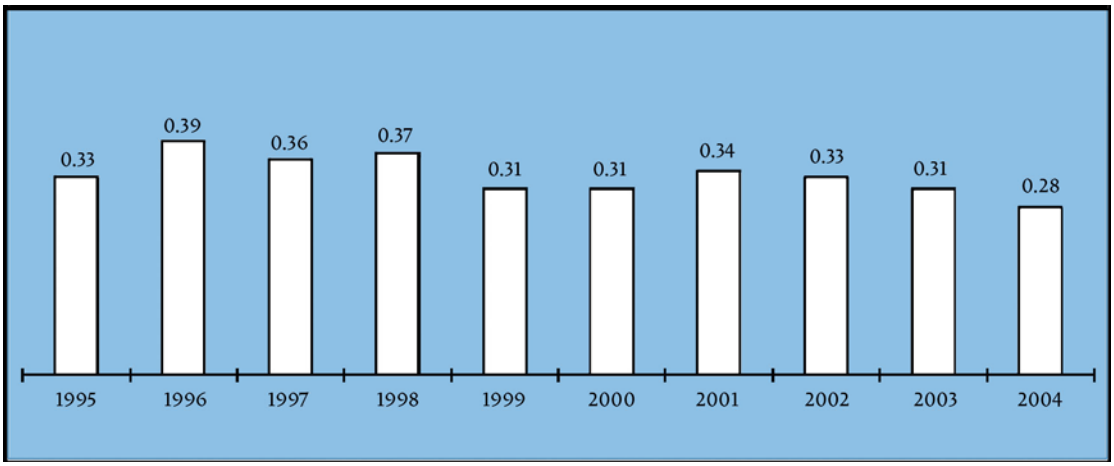
Much of this growth has come at the expense of the trucking industry, and signals the growing importance of railroad freight as a means to support just-in-time manufacturing and the delivery of spare parts and finished goods as part of a burgeoning requirement for highly efficient supply chains. A host of different industries, from automotive and heavy equipment manufacturing, to chemical and petroleum products, to forest products, coal, and others, are all increasingly relying on rail freight as part of their supply chain logistics solutions.

The rail freight industry's success, however, is coming at a price. Costs are rising for shippers and their customers, and the improvements in demand have led to a serious rail freight capacity problem as well as a significant amount of inefficiency and waste that threatens further growth. Many railroads are failing to meet their targeted speed and delivery times, dwell times have in many cases increased, and customers have begun to call the industry to task for its poor performance. A recent article in the Los Angeles Times cited major concerns by intermodal

freight giant YRC Worldwide Inc. and UPS regarding rail freight's ability to meet these customers' on-time requirements.

These inefficiency problems are exacerbated by an unrelenting problem with losses due to damage in transit. Loss and damage claims have largely remained static as a percent of overall industry revenues over the last ten years, which means that there has been a significant growth in overall claims over the last decade. (See Figure 1.) The industry as a whole paid over $134 million to settle slightly over 100,000 claims in 2004, which represented .28 percent of total industry revenues.

Figure 1: Loss and Damage as percent of Revenue; U.S. and Canadian Railroads



Loss and damage as a percent of revenue are largely static, even in the face of increases in rail traffic and revenue.

Source: Association of American Railroads

Meanwhile, the issue of security and the problems with managing hazardous shipments continue to grow. Security concerns in the post 9/11 era have highlighted the fact that the over 100,000 tank cars shipped every year in the U.S. containing highly poisonous chemicals, such as ammonia and chlorine, are largely untracked and unmanaged. The vast majority of the $200 million spent since 9/11 on railroad security has been on spent on rail yard security, according to a recent New York Times article, with very little going to managing the tank cars and other rolling assets themselves.

Looking for Solutions: The Manufacturing Shop Floor and the Case for Railcar Data Visibility

The combined problems of dwindling capacity, quality challenges, increasing dwell times, and security issues, create serious limits on future growth and profitability not just for railroads, but also for the shippers and manufacturers that depend on rail freight to fuel the just-in-time economy.

Interestingly, these issues are neither new nor unknown in other capital-intensive industries, particularly in the manufacturing sectors that provide the bulk of the rail freight traffic today. An understanding of how manufacturing has recently improved its use of technology to solve some of these problems makes clear the opportunity that the RFTrax solution can offer to railroads, shippers, and manufacturers looking to improve the efficiency and effectiveness of rail freight.

In the manufacturing sector, the recent improvements in efficiency and cost-management have come through the integration of two relatively long-standing technology domains: the manufacturing execution systems (MES) that help automate the use of machinery on the shop floor, and the enterprise resource planning (ERP) systems that run the finance, materials management, order management, logistics, and other back and front office functions in the enterprise. While MES and ERP have both had a long historical presence in manufacturing, until recently, these two rich sources of information and decision-making capabilities operated completely separately. This meant that ERP systems attempted to plan and forecast without any knowledge of what is actually happening on a day-to-day, or hour-to-hour, basis on the shop floor, and the MES systems tried to manage shop floor operations without any direct visibility into the orders, forecasts, and plans coming from the ERP systems. The recent integration of these two systems and the visibility that each provide into key operations across manufacturing enterprises has provided one of the most significant means of improving overall manufacturing operations to take place over that last ten years.

EAC believes that there is a tremendous similarity between how manufacturers use MES to ERP integration and the opportunity for similar integration in the rail freight industry, with one important difference. While most rail freight stakeholders typically have some form of ERP system in the back office, there has been an historical lack of data at the shop-floor equivalent in rail freight – i.e. the boxcar, tanker, and locomotive level. Tapping these sources for data about

what is happening in real-time during loading, transit, and unloading, could provide a wealth of information similar to that traditionally provided by M ES systems to manufacturers. Integrating those data with ERP and equivalent systems could provide a windfall of information for improving the efficiency and profitability of all concerned.

The ROI of Railcar Data

The return on capturing data at the railcar level can be significant, and can have an important impact on improving dwell times and overall utilization rates, while limiting damage and loss. The following points illustrate where ROI can be realized from capturing railcar data:

- Manufacturers would be able to predict the condition of a load of freight based on an analysis of the g-forces the load was subject to in transit: a damaged load could be identified well before it reaches the plant, and an alternative shipment could be arranged in order to meet just-in-time requirements.
- Owners of large railcar fleets could also use these data to significantly shrink dwell times by being able to monitor the exact location of an entire railcar fleet, thus preventing "warehousing" of railcars and speeding up their reuse.
- Shippers could use these data to improve overall service delivery and efficiency by better managing railcar movements and use.
- The railroads themselves could significantly lower their costs and improve their margins by being able to understand the sources of problems such as truck-hunting – the potentially destructive shifting of railcars and their loads in transit – as well as derailments and improve their maintenance of both their track and rolling assets.
- Integrating those data "upstairs" into the ERP systems can provide an even greater return on investment (ROI): Integrating railcar data with ERP data can significantly improve the rail freight industry's ability to be a key partner in initiatives such as just-in-time or lean manufacturing, vendor managed inventory, and other highly visibly efforts to improve supply chain responsiveness across the board.

ROI FACTORS FOR RAIL FREIGHT STAKEHOLDERS

Manufacturers

- Lower Dwell Times
- Predictive Analysis of Damage and Remediation for JIT Operations

Shippers

- Improved Rail Fleet Utilization and Service Delivery
- Lower Damage/Loss Claims

Railroads

- Improved Fleet Utilization, Service Delivery, and Track Maintenance
- Lower Damage/Loss Claims

All Stakeholders

- ERP Integration Yields
- Improved Supply Chain Responsiveness

Research abounds on the ROI of linking the manufacturing shop floor to the rest of the enterprise software environment. EAC's research shows that a typical MES to ERP connectivity project can yield a year-one ROI of 45 to 120 percent of implementation cost, based on an average year-one implementation cost of $450,000. Year two and three data are similar, minus the implementation costs, and in virtually all cases, a greater than 100 percent ROI for MES to ERP integration projects are realized by year two.

Another research firm, AMR Research, sees the specific annual payback of what it calls enterprise manufacturing intelligence (EMI) – also a marrying of ERP and MES data – as ranging from a factor of one to a factor of ten per year. In other words, manufacturers that have implemented EMI solutions have seen an annual return on their investment in EMI equal to, at a minimum, the initial cost of the investment, with some implementations yielding a return of ten times the cost of the investment.

ERP market leader SAP's own ROI analysis of its shop floor-to-ERP implementations shows a similar high value. One SAP customer, Whirlpool, was able to save several million dollars due to its ability to improve quality controls and operational efficiency by building an analytical environment that could track essential production processes and report any discrepancies or anomalies for remedial action. Other SAP customers, like Dow Corning, Conectiv Energy, and Arla Foods, among others, all report significant ROI from linking their MES systems to SAP's ERP software.

The State of the Art Today

While the presence of MES systems in the manufacturing sector made this linkage relatively easy to accomplish, the rail freight industry has lacked an historical equivalent system for gathering railcar data, much less integrating it with ERP data.

For the most part, railcar data gathering technologies are rare, costly, or limited in what they can provide in terms of actionable information. There are some providers of sensors to monitor impact and other data, but for the most part these sensors are extremely expensive and of limited reliability. Lower-cost RFID (radio frequency identification) is used extensively to track railcars and their contents, though the technology of RFID limits the data gathering to perimeter monitoring systems. Thus, the data that standalone RFID can collect is imperfect at best: the RFID tags can only signal the presence of a railcar in a particular place at a particular time, but cannot impart any information about the status of the railcar or its contents. (See *RFID Integration: The Identec Solutions Partnership,* below, for a description of how RFTrax and RFID provider Identec are solving these limitations.)

The lack of intelligent and cost-effective sensor technology has also limited the quantity and quality of railcar data that can be gathered. MES systems have had a relatively easy set of specifications for gathering real-time data from machines and robots on the shop floor: these are physically static systems, usually located in relatively clean and well-monitored factories, that are easily connected via Ethernet to local control systems, and ultimately to an ERP system. The world of railcar monitoring is the diametric opposite. Railcar sensors need to be able to withstand not just the g-forces and inclement weather that are endemic to high-speed rail transit, but must also be able to communicate their data regardless of their location, and do so in an extremely energy efficient manner. And, to be truly useful, these sensors must be able to gather a wealth of

information about the status of the many different types of railcars and their contents on a real-time basis.

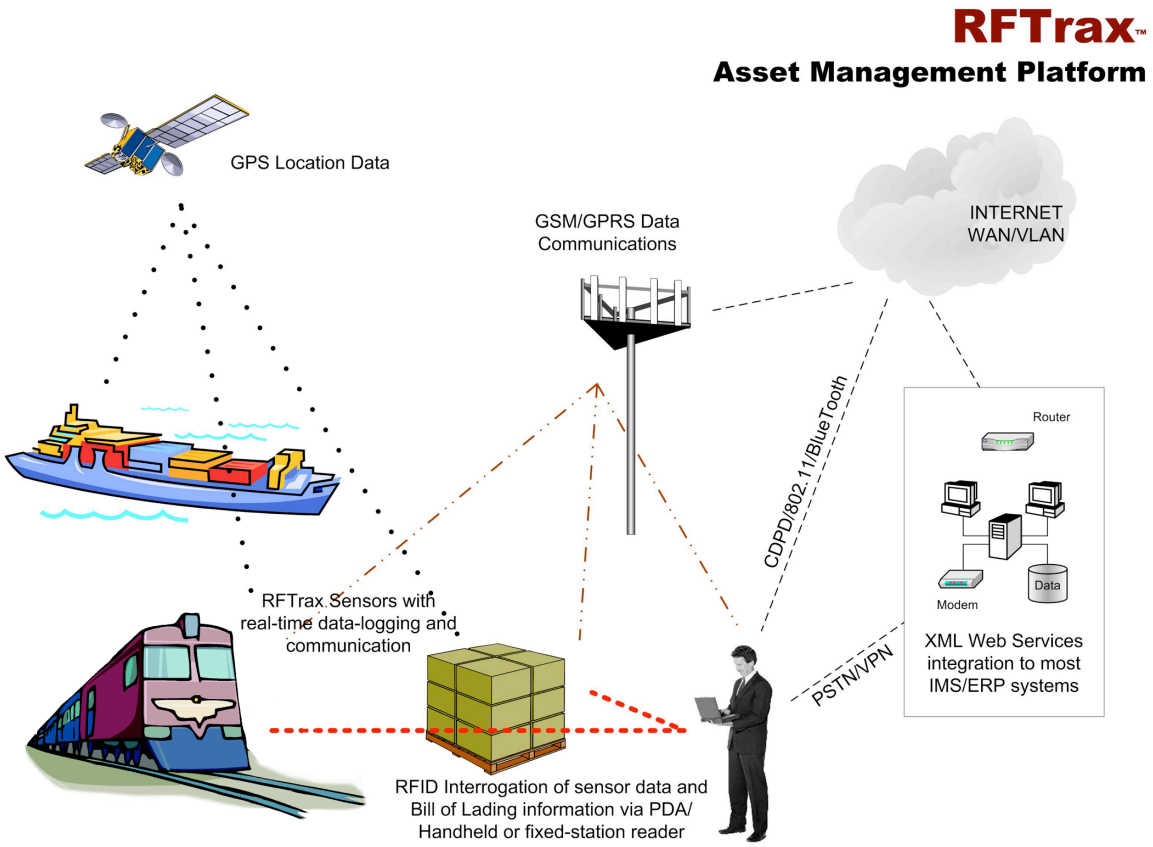
While to date there has been no solution that meets these criteria up until now, as we shall see in the next section, RFTrax's solution is designed precisely to meet these requirements and deliver an ROI to the rail freight industry that is similar in scope to what has been available to the manufacturing shop floor, and back office, for some time. EAC believes that the RFTrax offering has the ability to achieve these goals, and in doing so significantly change how the rail industry functions, very much for the better.

RFTrax Solution Overview

RFTrax is seeking to solve these problems with a combination of hardware and software that delivers a real-time solution for information access and asset management for three major constituents: railroads, shippers, and manufacturers that own and manage a fleet of railcars. (See Figure 2.)

On the hardware side, the RFTrax solution includes the Asset Command Unit device, or ACU, and a set of sensors that are specifically designed to capture data on the status of an individual railcar or locomotive, depending on the contents and issues that need to be tracked. The ACU is mounted on the railcar or locomotive, and collects data from the sensors, synchronizes that sensor data with GPS location data and a time and date stamp, and then stores and transmits relevant data back to the RFTrax Asset Management Platform (A.M.P.) software environment using satellite and wireless technology. The ACU and its sensors are highly ruggedized, they function using, leveraging technology and experience gleaned from Fairfield's work in seismic sensing and other industrial sensor applications, and use very little energy.

Figure 2: RFTrax Sensor Communications



Source: RFTrax

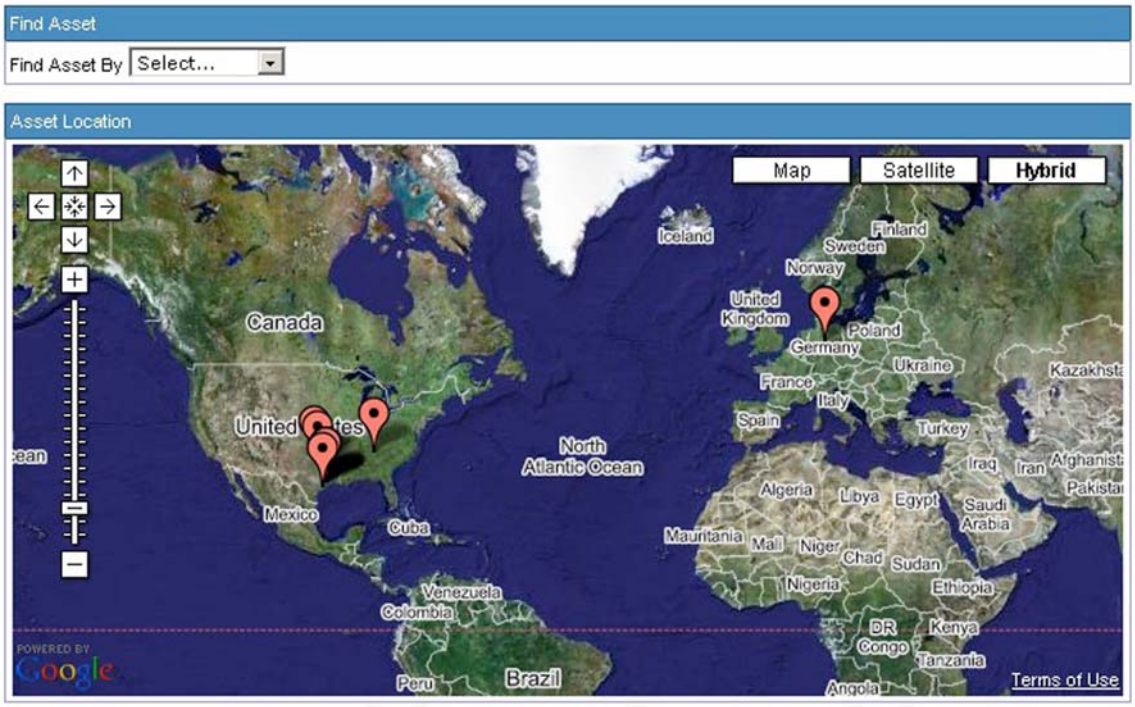
There are eight types of sensors that can be deployed with an ACU, depending on the specific requirements of the railcar.

- **Shock and Vibration Sensors.** These sensors are able to detect acceleration and other g-forces as they affect a railcar in transit. This can be extremely useful for detecting in-transit jolts, shaking, or truck-hunting that could potentially damage shipped goods or railcars.
- **Hazmat Sensors.** These sensors can detect threshold levels of chlorine, alcohol, ammonia, fuel, and other volatile organic compounds (VOC) and hazardous materials. Thus low-level leaks can be detected before they become hazardous to workers and the surrounding environment.
- **Fuel Monitoring Sensors.** These sensors can monitor fuel levels and allow optimal deployment of locomotives as well as support fuel efficiency efforts.

- **Load Status Sensors.** These sensors can detect whether a railcar is loaded or empty, or is in the process of being loaded or emptied. This further supports railcar utilization and optimization efforts.
- **Intrusion Detection Sensors.** These sensors use photoelectric, infrared, and electro-magnetic readers to determine the status of hatches and doors on railcars and tankers. This allows stakeholders to know when a rail asset has been opened and/or breached unexpectedly.
- **Radiation Sensor.** While also a form of security sensor, these are used specifically to detect very low levels of gamma ray radiation and can be used to monitor the status of radioactive shipments in real-time.
- **Inventory Management Sensors.** These sensors can monitor the presence or absence of specific goods or objects and report any status change to the ACU.
- **Temperature and Humidity Sensors.** These sensors can detect changes in temperature or relative humidity levels both inside and outside a railcar that could indicate either a breach of the railcar or an environmental change that could affect the quality of the goods being shipped.

Data that has been rolled up from the sensors into the ACU is then transmitted via cellular, satellite, or other wireless technology to the A.M.P. user control system. The A.M.P. can be used to program the specifications for the sensors and define the business rules that describe the processes for acting on out-of-specification alerts and other anomalous data from the ACU. The A.M.P. has a geographical interface that shows the real-time location of the railcar assets, as well as the key sensor data that is currently being transmitted from that asset (see Figure 3).

Figure 3: A.M.P. Dashboard Screen



Current Status - All Assets

Asset Name	Last Report Time (CST)	Location (Lat/Long)	Speed (MPH)	Fuel	Voltage Level	Temp (C/F)	Distance From Nearest City
BNSF 3140	03/12/06 01:00 AM	33.550, -97.837	29.9	0	71.5V	37.0°C / 98.6°F	0.8 mi SE of Bowie, TX
BNSF 3179	03/16/06 04:20 PM	32.819, -97.328	0.0	0	7.2V	36.6°C / 97.8°F	2.5 mi SE of Blue Mound, TX
NS-2412	03/16/06 06:01 AM	34.991, -85.228	0.0	0	6.9V	4.4°C / 39.8°F	0.7 mi SE of East Ridge, TN
RFTX 01-15	03/16/06 03:30 PM	29.617, -95.606	0.0	0	7.3V	27.3°C / 81.2°F	1.3 mi NE of Sugar Land, TX
RFTX 02-02	03/16/06 10:07 AM	0.000, 0.000	0.0	0	0.0V	24.6°C / 76.2°F	Unavailable
RFTX 04-06	03/16/06 06:00 AM	29.617, -95.606	0.0	0	6.5V	29.7°C / 85.5°F	1.3 mi NE of Sugar Land, TX
RFTX 05-07	03/03/06 06:00 PM	29.625, -95.601	0.0	0	6.4V	28.8°C / 83.9°F	1.9 mi SW of Meadows Place, TX
RFTX 06-08	03/16/06 04:28 PM	28.714, -96.227	0.0	0	7.4V	33.1°C / 91.7°F	0.6 mi NW of Palacios, TX
RFTX 10-11	03/10/06 02:36 PM	29.617, -95.606	0.0	0	6.4V	29.3°C / 84.7°F	1.3 mi NE of Sugar Land, TX
RFTX 11-01	03/14/06 02:01 AM	51.906, 10.429	0.0	0	7.1V	22.8°C / 73.1°F	Unavailable
RFTX 12-12	03/16/06 04:00 PM	29.617, -95.606	0.0	0	7.3V	32.1°C / 89.7°F	1.3 mi NE of Sugar Land, TX
RFTX 14-13	03/16/06 04:00 PM	29.617, -95.604	0.0	0	7.2V	29.3°C / 84.7°F	1.3 mi NE of Sugar Land, TX

Source: RFTrax

RFTrax customers can either use the A.M.P. as a standalone system or tie it into an ERP system in order to enhance the overall value of the solution. As a standalone system, the A.M.P. can provide significant value in terms of the ability to track in real-time the movement of specific railcars and changes in their status. A link to an ERP system would allow an even greater value: ACU data could be synchronized with ERP information regarding shipment type, hazmat status, quantity, destination, and other data. This linkage would allow a railroad, shipper, or manufacturer to proactively act on an alert or other event from the ACU, based on a very

complete picture of the issue at hand. (See *RFTrax Deployment Scenarios,* below, for further discussion of the different opportunities that A.M.P. to ERP connectivity can provide.)

Integration to the ERP layer is relatively straightforward: RFTrax can connect with industry leading ERP or application server environments using standard API and/or web services, depending on the user requirement. RFTrax data can be loaded into data warehouses as well as real-time business intelligence tools, and thus can be part of an analytical environment that supports logistics tracking, vendor-managed inventory systems, just-in-time and lean manufacturing operations, and other major supply chain functions.

EAC believes that this ability to move sensor data into the ERP environment for further action represents a significant opportunity for improving overall rail freight efficiency to the benefit of all stakeholders. The design and deployment scenarios for the RFTrax solution appear to show a relatively low-cost and highly extensible model for bringing the value of railcar data to bear in lowering costs and improving service for the rail freight industry.

RFTrax Deployment and ROI Scenarios

In researching the RFTrax solution, EAC has identified five potential deployment scenarios, including an RFID solution recently developed with partner Identec. While these deployment scenarios are, for the present, hypothetical, EAC believes that each has the potential to be realized as the RFTrax solution reaches the market over the next year.

Asset Tracking, Fleet Management, and Dwell Time Remediation. This is a general-case scenario that illustrates the overall value of the RFTrax solution. Railcars fitted with an ACU and any RFTrax sensor can report location data back to the A.M.P. in real-time. A shock and vibration sensor, for example, can provide telemetry-related data that can be used to schedule preventative maintenance for railcars that exhibit excess motion or truck-hunting.

The ROI from this scenario can be realized in the following ways:

- The ROI for manufacturers from these deployment scenarios comes from the ability to see where in the rail network vital supplies or finished goods are, and use that data to better manage a just-in-time or vendor-managed inventory process. Manufacturers that

own large fleets can also use these data to lower their dwell times and improve their fleet utilization rates

- Shippers can obtain an ROI by using these data to improve service delivery, lower dwell times, and lower overall costs. An RFTrax system can provide real-time visibility status information directly to customers, removing a significant cost from the shipper while simultaneously improving overall customer satisfaction. Shippers can also use RFTrax to better track railcars and prevent their use as long-term warehouses. Sensor data can track when a car is opened and at what rate it is being unloaded. Railcars that are sitting unused in a rail yard can be easily identified and recalled.
- The railroads can use asset tracking as a means to better optimize the use of their railcar fleets, thereby improving capacity, maintenance, and service delivery without increasing fleet size. The ability to provide RFTrax-related services to their customers – the shippers and manufacturers – can by itself provide a significant ROI for railroad operators.

Impact, Truck-Hunting, and Other Telemetry-Related Events. RFTrax's accelerometer sensors can provide important real-time data on g-forces, speed, and other motion-related issues and events. These data can identify problems with high-impact rail yard and truck-hunting events, and, using GPS data, correlate these events with a specific rail yard, shipper, or section of track. The ROI from these scenarios can be realized in the following ways:

- The ROI for manufacturers, as noted earlier, comes from the predictive nature of these data. Knowing that a shipment of windshields has suffered a major impact or other event, for example, will allow manufacturers to predict damage and adjust their supply chain accordingly. Supply chain disruptions can be extremely costly to manufacturers – JIT manufacturing delays can cost $20,000 for every minute of downtime. Remediating these delays can have a major impact on efficiency and costs.
- The ROI for shippers comes from the ability to improve service levels by tracking problem shipments and railcars, and using that tracking data to provide tactical solutions to expected delays as well as improve maintenance and service for railcars that may have equipment problems. The bottom line is that shippers can improve their service levels while lowering their overall costs.
- The ROI for railroad companies is simple: accurate information about where and under what circumstances a shipment became damaged can help limit damage losses, help

prevent derailments by removing problem railcars or identifying bad tracks, and can help improve overall railroad performance.

Security and Hazmat Cargo Management. RFTrax solutions provide a platform for improved security management, particularly for hazardous cargos. In addition to generic location data, tank cars can be fitted with photo-electric sensors that can detect open hatches and other breaches, as well as sensors that can detect changes in humidity that may effect the stability of a particular shipment. Likewise, radiation leaks can be detected using a radiation sensor, and leaks of alcohol, chlorine, and VOCs can be detected using chemical-specific RFTrax sensors. The RFTrax A.M.P. can be used as a platform for creating real-time tracking of hazardous shipments and the management of railcar incidents related to security and hazardous material release. When linked with ERP data, first responders can be notified of the exact contents of a specific railcar that may have been breached in an accident or security incident.

The ROI from this scenario can be realized in the following ways:

- The ROI for security and hazmat management is largely in prevention and risk mitigation for manufacturers. Being able to track and manage highly valuable or dangerous cargoes allows manufacturers to lower their overall risk and liability, while improving compliance with legal and regulatory requirements.
- The ROI for shippers and railroads is similar. Improving security and hazmat management is a key responsibility for these stakeholders: Using an RFTrax solution can allow them to maintain compliance and lower their liability and risk.

RFID Integration: The Identec Solutions Partnership. RFTrax recently entered into a strategic agreement with RFID asset management vendor Identec Solutions, based in British Columbia. The combination of Indentec RFID tags tracking the individual contents of a railcar and the RFTrax sensors tracking the physical status of the railcar can further enhance the overall management of valuable cargoes: The integration of the Indentec and RFTrax data can help closely track individual components in a shipment, and assist in tracking how a particular shipment may have been damaged or compromised.

The addition of the Indentec RFID technology has the potential to enhance the ROI for manufacturers and shippers by providing a more finely grained monitoring and management

function for shipments. Knowing the status of an individual component in a larger shipment can be valuable for supporting supply chain or vendor-managed-inventory processes that are dependent on the timely arrival of an individual part or supply, for example. The ability to track at the part level, as well as at the railcar level, provides even greater visibility for manufacturers and for the shippers responsible for the timely arrival of the goods or supplies. Aligning these data with ERP systems at the shipper or manufacturer can provide a significant ROI by supporting ERP-based supply chain planning, order management, logistics, and other services. While there is a potential ROI for shippers and manufacturers, as few railroads have any responsibility for the individual components of a shipment, the Indentec/RFTrax solution has no specific ROI for railroads.

Locomotive Management. As locomotive management is uniquely the responsibility of the railroads, this special-use case and its ROI pertain uniquely to the railroads. The RFTrax Locomotive Solution can capture and transmit sensor data on fuel, coolant temperature, speed, alarms and virtually any other data stream that can be captured in digital format.

The ROI for the railroads comes from improving maintenance and service on a key piece of capital equipment, as well as assisting in overall fleet management functions by keeping track of locomotives in real-time.

Conclusion: Towards a Rapid ROI for All

EAC's analysis of the opportunity that RFTrax presents shows the potential for an excellent ROI for the manufacturers, shippers, and railroads that choose to implement this solution. While the maximum ROI benefit can accrue from integrating RFTrax to an ERP or other back-office system, there is a significant value in a more incremental implementation that starts with deploying the RFTrax solution as a standalone system. This ability to derive a first level of ROI is crucial to the success of RFTrax. Once realized, this initial ROI can be augmented through a relatively simple integration to the ERP system, which can be expected to yield an order of magnitude increase in ROI as well.

RFTrax's offering is still relatively new, and the company will need to execute on this promise before it can be declared an unqualified success. The track-record of RFTrax's parent company, Fairfield, provides considerable assurance that the experience and knowledge that was needed to

bring Fairfield's other successful solutions to market can be brought to bear on the rail freight industry and the needs of its stakeholders.

The bottom line is that improving the real-time flow of information from the railcar to the enterprise isn't just a good idea. It's based on a model of success in other industries that is a proven means by which efficiency can be improved and key decisions can be made using up-to-the-minute information. This revolution will happen one way or another in the rail freight industry; the economics of such a solution are too compelling. Those companies that choose to deploy these solutions will reap a significant competitive advantage, and any stakeholder in the rail freight industry looking for an additional competitive advantage would do well to consider what RFTrax has to offer.

