# Case Study: Blendtech Cuts the Cost of API 2350 Compliance

***Cost-effective automated reconciliation for petroleum distribution terminals improves safety and accounting***

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# CASE STUDY: BLENDTECH CUTS THE COST OF API 2350 COMPLIANCE

## *Cost-effective automated reconciliation for petroleum distribution terminals improves safety and accounting*

The path that crude oil takes from extraction to conversion to consumption is long and carefully managed. For financial and environmental safety reasons, every step of the distribution process has to be monitored and controlled in a process called custody transfer.

Primary distribution terminals (PDTs) are critical parts of this system, where petroleum products are received—usually from pipelines or ships—and then discharged onto trucks, ships, or rail cars in structures called loading racks.

Many jobs need to be performed to keep these terminals and loading racks running efficiently and in compliance with government regulations and industry standards. Terminal Automation Systems (TAS) are commonly used to automate these functions. They bridge the SCADA systems used to control and monitor field devices (electronic meter registers, tank level indicators, valves, pumps, etc.) with back-office systems. For example, a TAS might provide point-of-service authorization to permit fuel loading and then direct billing information to the terminal's ERP system.

Recently, however, the American Petroleum Institute (API) introduced updates to API Standard 2350, "Overfill Protection for Storage Tanks in Petroleum Facilities," that significantly changed the way that tank receipts are handled. Critically, it added a requirement to implement a management system with formal processes for reconciling receipts and distributions.

The motivation behind the standard is to increase safety in places like PDTs where petrochemical spills risk vapor cloud explosions and other dangers to personnel and the environment, not to mention lawsuits, fines, and facility closure. But reconciliation is a major undertaking, requiring periodic accounting of incoming and outgoing flow meter registers and tank level gauges to identify potential discrepancies.

### THE CHALLENGE

Blendtech is a division of PT Industrial Electric (PTI), suppliers of TAS for oil and gas distribution. The company offers expertise in design, engineering, installation, implementation, commissioning, training, and support of bulk product handling and loading equipment, additive and dye injection, ratio and wild stream blending, and a wide variety of custom process solutions for petrochemical and chemical industries.

**A loading rack for tanker truck transfers**

One of Blendtech's customers approached them seeking help to comply with API 2350. At the time, this customer was using a labor-intensive verification process every 24 hours, recording information in spreadsheets and reviewing them manually. Thus, in addition to improving compliance, the customer hoped to improve operational efficiency, tank utilization, and accounting accuracy as well.

The fundamental challenge to reconciliation is the quantity of data required, so there are two common approaches to improving compliance:

- Take manual inventory more often.
- Bring more field data into the TAS.

**A terminal automation system (TAS) monitoring screen**

For smaller terminal operators like Blendtech's customer, neither option is attractive, since either hiring more personnel or expanding infrastructure might require an investment of hundreds of thousands of dollars.

## THE GOAL

Blendtech's task was to find a third option—a way of automating this costly process that would be feasible for their customer.

Several years ago, Blendtech began working in the space of information technology (IT) and operations technology (OT) convergence, as more of their projects required bringing data from field PLCs into TASs.

Initially, they experimented with Ignition SCADA® to bridge these systems, but later used Node-RED on Opto 22's *groov* Box™, because it didn't require deploying and maintaining a PC. Blendtech had used Opto 22 products for over 25 years, integrating SNAP PAC controllers, G4/G1 I/O, and SSRs into their own TAS product.

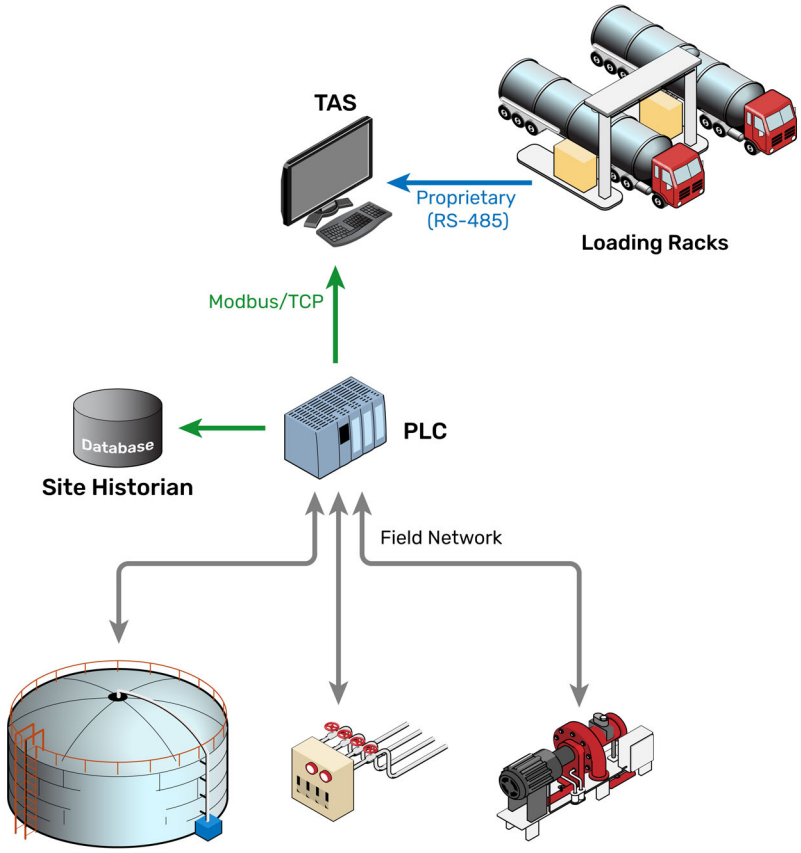
For this project, they envisioned a similar solution, and looked to the latest generation of industrial connectivity products, including MOXA gateways and Opto 22's *groov* EPIC®.

Their goal was to build a transaction history in the customer's site historian using the data reported to the TAS. In particular, they needed data from custody transfer-certified meter registers located at each loading rack and from pipeline manifolds where incoming fluid transfers are measured.

With an accurate transaction history in place, it would be possible to reallocate personnel currently used for reconciliation and have back-office operations staff audit tank usage more frequently. It would also be possible for accounting staff to perform more accurate internal audits, providing a basis for continuous improvement.

## THE SYSTEM

So if meter register data was already reported to the TAS, why didn't the customer already have an accurate transaction history they could use?




**An example control system network for a PDT**

The short answer is that there simply wasn't a bridge between where the data was available and where it needed to be. There was no connection between the TAS, which resided on a corporate network, and the site historian, which was part of the control network. Further, the data stored in the TAS required normalization—additional processing to format data items consistently—before it could be added to the site historian.

The control network contained an Allen-Bradley® PLC that provided some aggregation of field I/O data, but it lacked connections to the loading rack meters and the functionality to read and process data from the TAS database. The flow meters themselves were controlled by their own embedded logic, independent of the field PLC, and reported their values back to the TAS using a proprietary protocol that wasn't accessible to the rest of the control system.

## THE SOLUTION

In order to bridge these separate systems, Blendtech chose to build their solution on Opto 22's *groov* EPIC. It provided all the functions they needed in a single package—secure connectivity, data processing, and storage—which meant they didn't need a PC or additional hardware to complete the design, and it was backed by excellent user documentation and free customer support.

"It was really the total package—the combination of price, support, look and feel, and overall functionality," says project engineer, Nick Palozzi.

With *groov* EPIC, Blendtech was able to present their customer with a reliable data aggregation solution that significantly reduced the cost of API 2350 compliance.

### Step 1: Bridge the networks

Just like the smartphone has in many cases taken the place of dedicated consumer devices (cameras, phones, laptops), the power of edge computing makes it possible to use one device to perform the work of many industrial devices.

At its heart, *groov* EPIC is an industrial controller capable of high-speed I/O operations; but in this case, Blendtech took advantage of its connectivity and processing power to use it as a secure network gateway.

The *groov* EPIC processor (GRV-EPIC-PR1) has two completely segregated network interfaces, so that trusted and untrusted networks can be isolated. This segregation

**"It was really the total package—the combination of price, support, look and feel, and overall functionality."**

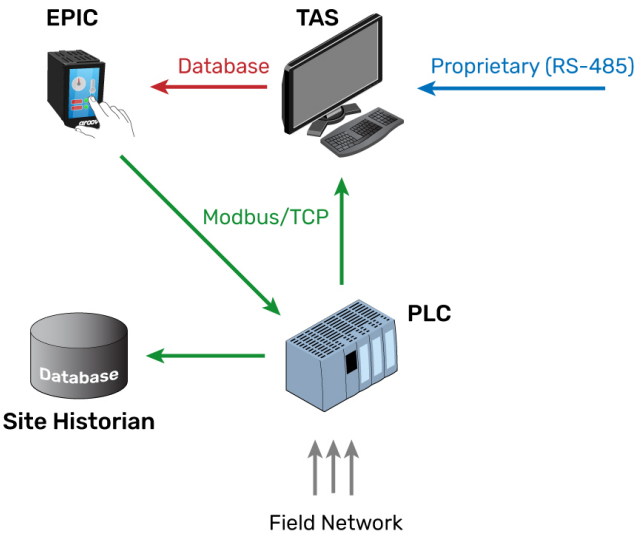
**- Nick Palozzi, Blendtech project engineer**

solved the basic problem of bridging the corporate and control networks without permitting unregulated traffic between them.

The controller fit comfortably into the existing control cabinet using a zero-I/O chassis (GRV-EPIC-CHS0), a small-footprint housing (5.36" x 3.54") for applications that don't require I/O operations.

### Step 2: Retrieve and normalize

While legacy PLCs may be capable of communicating using various industrial protocols, they are usually unable to interface with modern IT systems directly. With *groov* EPIC on the network, however, Blendtech could build a custom data processing interface for the TAS directly into the controller using the embedded Node-RED IoT connectivity software. Node-RED boasts a large library of functions for connecting data sources, including drivers for many popular databases.




**Blendtech used *groov* EPIC to provide data processing and secure connectivity between corporate and control networks.**


**Certified meter registers like these were an important source of data for Blendtech's customer.**

The ultimate goal was to provide time-sequenced data as a series of Modbus registers that the master PLC could read from the *groov* EPIC processor. That wasn't the native format of the data in the TAS, however, and depending on which loading rack the data originated from, various operations had to be performed to achieve this consistent format.

Blendtech designed event triggers to recognize when data in the TAS had been updated, as well as the source of the data. Then they invoked logic to sequence, format, and scale appropriately for the specific data source. Blendtech used Node-RED to handle all of this, with custom formatting logic in embedded Javascript functions.

## Step 3: Transfer

With all this work done, the final step was to move data into the site historian.

"The memory storage of the EPIC was an important factor," notes Palozzi, because with 6 GB available on a fault-tolerant solid-state drive (SSD), the EPIC could also serve as the temporary storage location for everything it retrieved from the TAS, ensuring no additional hardware was necessary to complete their solution.

After retrieval and processing in Node-RED, data was written to the *groov* EPIC's internal hardware memory map, where it could be accessed via Modbus/TCP requests from the master PLC. Once there, the historian could poll the PLC at regular intervals to add this data to the site archives.

## An EPIC bonus

Blendtech also took advantage of *groov* EPIC's built-in touchscreen and embedded *groov* View server to design a basic HMI for controller and network health monitoring.

Since *groov* View is mobile-ready, the status of the controller can be viewed from any smart device or computer connected to the network, using the built-in user access controls to maintain security.

## THE FUTURE

Ultimately, Blendtech was able to meet their customer's goal, delivering a solution to automate inventory reconciliation at a fraction of the cost of the typical alternatives. With significantly less manpower, they can audit their transaction history every hour instead of every day, improving their accounting granularity and increasing confidence that product is being safely managed.

What's next? With around 30 similar installations in Canada and 120 across the U.S., Blendtech continues to present their reconciliation solution to more potential customers. The next generation of the product will take advantage of *groov* EPIC's native support for Ignition by Inductive Automation®. By installing the full Ignition Gateway and

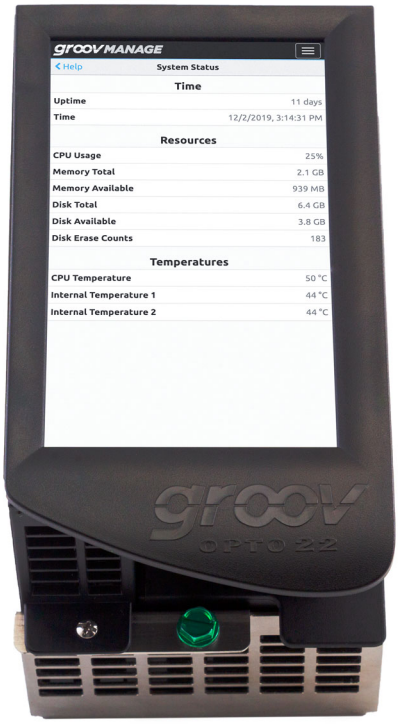
**The *groov* EPIC zero-slot chassis integrates comfortably into small spaces.**

**With 6 GB available on a fault-tolerant solid-state drive, the EPIC could also serve as the temporary storage location for everything it retrieved from the TAS.**

SQL-Bridge module on the EPIC, Blendtech plans to design even more robust transactional logic into their TAS database monitoring.

They are also expanding their portfolio of custom IIoT applications built on *groov* EPIC. For example, they are developing a traffic management system for use in distribution terminals. Using the EPIC's I/O control functions, the system will control high-visibility lane and wait-time indicators to optimize the flow of tanker trucks through loading racks.

For more information on Blendtech, visit blendtech.com or call **1-888-386-8122**.





**The *groov* EPIC's built-in touchscreen can display system health information locally and serve it up to mobile devices as well. The touchscreen swings open to reveal processor wiring and LEDs.**

## ABOUT OPTO 22

Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable. Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company developed the red-white-yellow-black color-coding system for input/output (I/O) modules and the open Optomux® protocol, and pioneered Ethernet-based I/O.

In early 2013 Opto 22 introduced *groov* View, an easy-to-use IoT tool for developing and viewing mobile operator interfaces—mobile apps to securely monitor and control virtually any automation system or equipment.

Famous worldwide for its reliable industrial I/O, the company in 2018 introduced *groov* EPIC® (edge programmable industrial controller). EPIC has an open-source Linux® OS and provides connectivity to PLCs, software, and online services, plus data handling and visualization, in addition to real-time control.

All Opto 22 products are manufactured and supported in the U.S.A. Most solid-state SSRs and I/O modules are guaranteed for life. The company is especially trusted for its continuing policy of providing free product support, free online training, and free pre-sales engineering assistance.

For more information, visit opto22.com or contact Opto 22 Pre-Sales Engineering:

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