

# Oceaneering Delivers Innovative Automated Transport System to Leading Medical Facility

## Customized AGV system streamlines hospital logistics

### Project Overview

In 2007, a large Ohio-based medical facility expanded its clinical areas and required additional support space. As part of this expansion, the Oceaneering Automated Guided Vehicle (AGV) Systems team developed and installed an automated transport system (ATS) to carry supplies between a new, purpose-built service center and the medical facility. The complete logistical solution provided by the ATS included 81 AGVs, 60 AGV chargers, dispatch panels, servers, supervisory software, 1,044 carts, and cart washers.



## Project Requirements

The customer needed a logistical solution to address its requirement for a centralized material management area – a system that would be responsive to demand and also scalable and supportive of large vertical and horizontal travel. Additionally, the customer required a solution that could be implemented without a shutdown of its current operations.

## The Oceaneering Solution

Oceaneering developed a customized system for the medical center's newly built, multi-purpose service center, which houses items such as food, linens, sterile instruments, medical supplies, mail, and receptacles for waste. The system needed to provide a solution to organize and transport goods via a tunnel connecting the service center and the main hospital building.

The ATS was designed to control the automated driving of the AGVs and dictate the traffic flow, and to interface with operators and the warehouse management system, as well as automated doors, fire alarms, and warning devices.

Operator interaction was paramount to the system's success, and allowed for requests and dispatches to be processed using a real-time touchscreen interface. The operator needed to be able to load and stage a cart so that the AGV could collect and deliver goods to the designated location. Once the cart's contents were delivered, an operator utilized a portable device to electronically confirm receipt.

The system needed advanced tracking systems to log and trace every cart handled, to map the most efficient routes, and to time deliveries in order to suit demand.

## Execution Plan

This project was completed in an extremely condensed time scale of one year, beginning in late 2007. The system required that significant planning, design work, and engineering would be completed in a window of just three months.

An initial analysis of needs was completed by a consultant who reviewed the medical center's logistical flow, along with the details of staging and delivery locations, and the overall path layout. Oceaneering used these preliminary findings to complete an extensive logistical analysis based on a transport matrix and detailed building drawings, and to design more refined systems for AGV routing and queuing.

The installation and commissioning of all equipment and software needed to coincide with the condensed medical facility building schedule, and was completed in a span of six months. This was completed successfully, and the project management teams worked to coordinate efforts between the numerous vendors involved. Documentation covered the intricacies of the system's hardware, including the AGVs, cart washers, sensors, and interface devices for operation and maintenance. The system's software was supported by additional documentation outlining details of the operator interface, system control interface and IT systems.

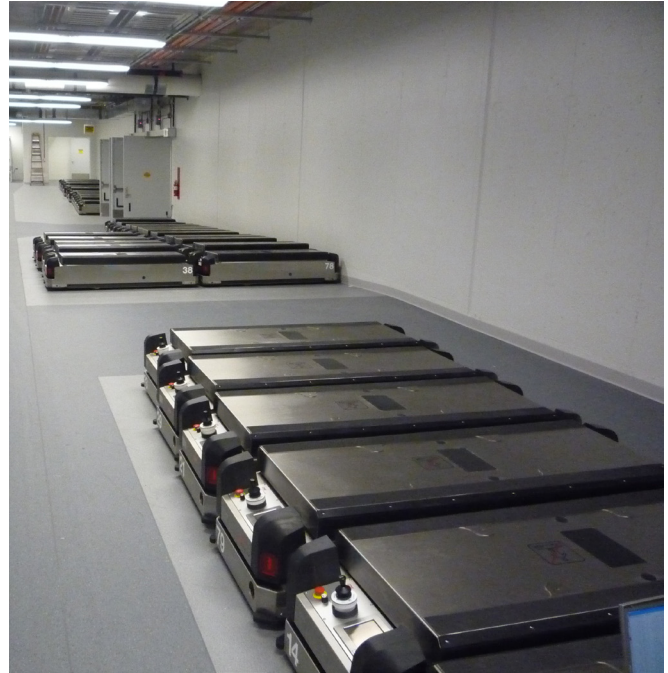
Oceaneering delivered a customized and comprehensive training program targeted at the varied audiences that would interact with the AGVs. A range of methods – spanning from awareness videos to hands-on classroom training – was developed to suit the training needs of management, department managers, operators and IT personnel.

As a medical facility is a demanding environment and the project schedule was firm, the Oceaneering and client teams had two months to roll out the entire system – including testing for anomalies and troubleshooting on the fly. A dedicated ground crew identified system modifications for input into the Oceaneering® SuperFROG® supervisory control system, which governs the operation of multiple vehicles within a preset layout. The teams also worked to ensure the safe operation of the system and its flawless integration with the medical facility's many interfaces. The system met the client's deadline and became fully operational in September 2008.

### Challenges

The main challenges in this project were the tight delivery of a large and complex turnkey system. Full engineering, installation and commissioning activities were completed in less than 12 months, and had to be completed while the facility was in full operation. This time scale and the sheer magnitude of the project required extensive planning and exceptional effort from all team members.

The system needed to interface with the customer's existing systems in their various buildings. These systems included the fire doors and automatic doors, radiation and radio-frequency identification (RFID) detectors, fire alarms, and the washing systems used to sanitize the carts. Further interfaces included those used for communications, along with solutions for vendors, consultants, and individual departments.



The actual AGVs included in the scope were built in Austria and shipped to site where they were commissioned. This posed logistical challenges and required timely execution to ensure success.

Oceaneering, the client, and a vast amount of other vendors were sharing the same workspace and executing tasks side by side. Construction activities limited the available space for staging, and the medical facility itself had to undertake the monumental task of transporting an entire warehouse of supplies to the service center. The communication, planning a controlled approach to all activities, inclusive of the AGV installation, was another challenge to overcome during the project.

## Equipment Highlights

Oceaneering supplied and supported a full system that included:

- » Four servers with fail-safe functionality in the event of a power failure and software and/or network failures
- » Magnet grid navigation, providing complete routing flexibility
- » Fully customized SuperFROG® supervisory control system
- » TomCAT cart and order management software system developed specifically for this project
- » Two primary system control workstations and five monitoring screens throughout the buildings to monitor the system
- » Sixteen touchscreen dispatch panels housed in identified departments
- » Forty Pocket PCs for requesting and dispatching AGVs
- » Approximately 1,044 carts for material handling
- » Two automatic cart washers
- » Guidepath materials, including dynamic safety signs, status beacons, cart detectors, magnetic interfaces with doors, fire alarms, radiation detectors, and RFID detectors
- » Eighty-one AGVs capable of transporting 1,000 lb per trip
- » Sixty AGV charging stations, supporting both opportunity and required charging, and providing a full, cordless charge in 10 minutes
- » Maintenance tools

## Results

The client benefited from a turnkey, automated logistical solution that was delivered on time, with an estimated return on investment (ROI) of two years. Supported by easily configurable software, the system is scalable and flexible – enabling the customer to expand or scale down this system as necessary. Since its completion, the system has been upgraded to include more carts and to also increase the capacity of the servers, which have been moved offsite.

The intuitive controls and approachability of the system's interfaces provide a positive user experience and ensure that materials are delivered where and when they are needed. The Oceaneering team's positive relationship with the client ensures that modifications, as required, can be made on the fly, allowing the system to remain operational.

The system's AGVs currently complete 2,000 transports and cover more than 1,000 miles every day. All activities are completed under the supervision of two full-time AGV technicians. The system has increased the operational safety and reliability of medical center deliveries, while providing complete tracking of internal material deliveries.