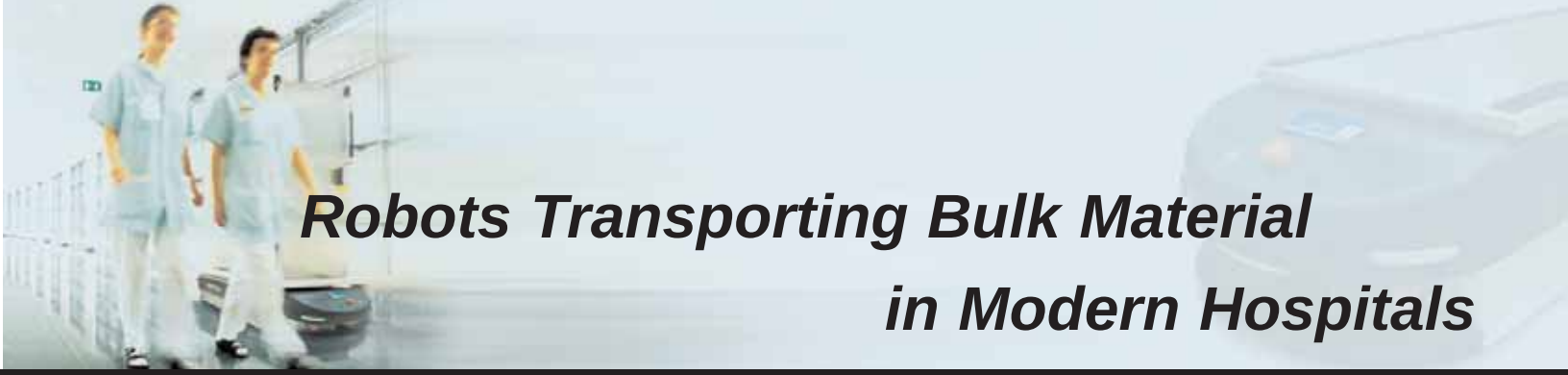

Robots Transporting Bulk Material in Modern Hospitals

Modern hospitals are choosing to automate transport of materials with robots, also known as Automated Guided Vehicles (AGV). Why all this high tech wizardry for such a mundane task? It is because the future is requiring change. Consider these two demographic and life cycle trends.

Trend #1:

According to the *2004 Report of the Social Security Trustees:* In 1950, there were 16 workers to support every one beneficiary of Social Security. Today, there are only 3.3 workers supporting every Social Security beneficiary. By the time our youngest workers turn 65, there will be only 2 workers supporting each beneficiary. For more information, visit: http://www.whitehouse.gov/infocus/social-security1.pdf

Trend #2

According to a recently released report prepared by the Office of the Actuary of the Centers for Medicare & Medicaid Services (CMS), spending for personal healthcare per senior citizen was almost 400 percent greater than for those under 65. According to this study, over 1/3 of these senior's healthcare spending is on hospital care. (http://www.seniorjournal.com)

Combine these two trends and you can quickly see that healthcare is changing. Total hospital spending will be increasing rapidly, and at the same time, there will be fewer people in the work force. The undesirable jobs (such as pushing 800 pound carts filled with soiled laundry, trash or soiled dishes; or even pushing the clean materials such as linen, surgical carts, patient meals or bulk supplies) will likely be the hardest jobs to fill.

Enter the Robots / Technology to the Rescue!

Swisslog, a leading provider of healthcare logistics automation solutions, foresees this growing need and manufactures laser-guided, battery powered, computer-controlled robotic vehicles that talk to a central computer for dispatching over WiFi networks. Now that is a mouthful!

These robots guide their way by scanning the contours of the corridors, door openings and other architectural features. There are no reflectors, guide tape, grid systems or wires required. This makes them easy to expand and enables them to re-adjust their position if they "see" they are off position to pick up a cart. The robots need space to travel corridors, service elevators (for vertical travel), and small holding rooms for cart queuing on the patient floors. The robots communicate

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with elevators using a WiFi - RF system, and the elevator signals back when it has arrived with its doors open. At Memorial Hermann Hospital in Houston, separate elevators are dedicated to the robots. This is common in larger hospitals to keep the soiled linen and bio-hazardous waste removed from public areas, plus there are usually enough carts working throughout the hospital to require dedicated elevators.

In route to a delivery location, the robot can send a page, instant message or e-mail to the receiving department, alerting them that the materials are on the way. The vehicles can also verbally signal their impending action, ie. “Attention, Vehicle Reverses Direction” or “Attention, Vehicle Starts”. The robots use a dual-range laser based obstacle-detection system. Detection of obstacles in the first range forces the robot into a slow speed. If an obstacle remains in the way, the robot will stop and announce “Please Stand Aside”. Voice commands are produced by wave files, and can be customized to say something special or in a preferred voice. Turn signals are used to alert humans of the direction the robot is to turn.

These state-of-the-art robots perform the task of moving heavy carts in hospitals, which is not new to hospitals. Earlier systems used overhead chain conveyors to move carts (like automobile plants move cars through an assembly line). Chain systems are inflexible to move or change. The chain system and predecessors to the current robots were used in hospitals as far back as the 70’s. In those systems, a vehicle would move a cart between point A and point B. Now, a central computer tracks each vehicle and knows which vehicles are busy or idle. The computer then picks the most efficient vehicle for the next job--minimizing deadhead travel (travel without a cart) and maximizing payback. The VA Hospital in Houston is a great example of a hospital that recently replaced their old system with TransCar robots from Swisslog.

The central computer also monitors robot battery charge levels and sends them to rapid chargers when low. The robots plug themselves in and in 20 minutes and are charged for another 4 hours of operation. Battery charging is fully automatic, allowing the robots to work 24/7. Considering a robot can work 3 shifts a day, 7 days per week, one robot can perform the work of 4 people pushing carts (see system components). The more hours the robots work, the fewer manual jobs employees have to perform. With this performance, return on investment is reached quickly.

New hospitals are planning for these systems and seeing the benefits. LAC+USC replacement hospital in Los Angeles is to be operational in 2007. It will employ a large fleet of TransCar robots to move the heavy materials through the new 3-building complex (an inpatient tower, diagnostics and treatment center and an outpatient tower). They are dedicated and reliable workforces of the future. Change your future today!

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