Manufacturing Automation

AUTOMATED MATERIAL HANDLING SYSTEM FOR SEMICONDUCTOR FAB

HTL helps leading provider of factory automation and logistics systems with feature enhancement of their product

When responsible for transportation of high capital materials in clean room of semiconductor fabs for advanced electronics goods, success depends on precision, throughput, and lead time of the task. Delays or errors can lead to missed transport calls, production delays, damaged material, and loss of key accounts.

Briefly:

HTL helped a leading manufacturer:

- Respond to market driven short time-bound features improvement.
- Allow their team to focus on core product while getting expert support.
- Retain and expand customer accounts amid competition.

Automated Material Handling System (AMHS) involves automated transport of large Flat Panel Display Masks during the manufacturing process from within the clean room. These are large, expensive, and fragile and need to be transported dust-free in the clean room reliably.

Overhead Hoist Transporter (OHT)* involves sophisticated software that controls the vehicles moving on overhead tracks to access the load port by belt driven hoisting mechanism in real-time on the factory floor.

Challenge:

When manufacturing advanced electronic goods, materials need to be transported in the plant in a dust-free and delicate manner within the clean rooms. This is best done by OHT Vehicles running on overhead tracks controlled by software. The core product team of the manufacturer needed a time-bound market driven product update as well as a dependable expert partner for a newer solution release. They were pressed for time and resources.

Background:

Our Client is a leading provider of factory automation and logistics systems that help with automated storage and transportation of

goods. Their OHT (Overhead Hoist Transfer) systems provide automated material handling for clean rooms within semiconductor fabs. This system is widely used as the main transport system for 300 mm FAB. It is used not only within the clean room but also for factory wide transport. The manufacturer has their own proprietary software that controls the vehicles. They wanted a market driven and short time-bound feature enhancement of their existing product. HTL Team stepped in both at client time zone and offshore to enable the collaborated development of additional modules of the software, while the core team continued to focus on their main product development.

Project Challenge:

Communicate with and synchronize all modules for design, development, and testing and co-ordinate between geographically distributed teams for a time-bound fast-paced release.

The software needed to merge with main working product and meet all requirements.

Our client manufactures the machines and has developed their own Framework* and MHS (material handling system) Software that helps control their movement and function.

The design involves charting the path for the OHV at the stations by mapping their path using tools.
Our on-site team created the design diagrams by analyzing the existing source code, sequence diagrams, and requirement specification provided by the client. The flow charts and class diagrams were then generated to architect the solution.
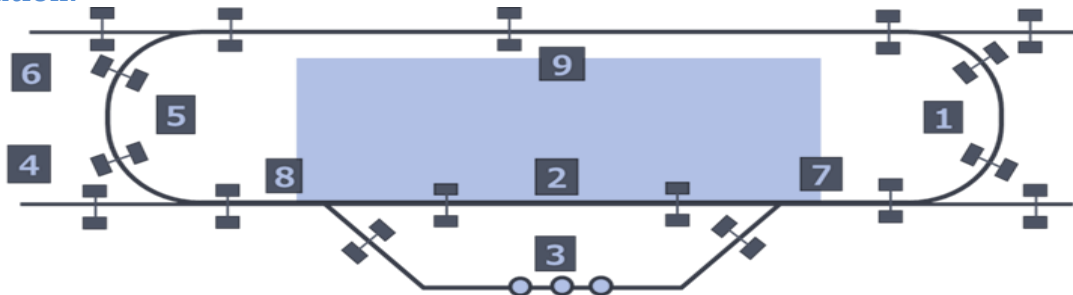HTL was involved in this project for the following two attributes:
   o   alternate transfer
   o   dynamic Transfer

 HTL Team continued to be involved in design, implementation & testing for the new phase:
   o   Stage transfer

Solution:

Map View Tool is a tool to view & edit the map data. Map data describes the vehicle path, module number, block number, station number etc. Above figure shows an example of a map using this tool.

Terms:

Alternate Transfer: Alternate transfer is transferring material at an alternative destination when transfer is not possible to the originally designated station.

Dynamic Transfer: It is function that cancels the current transport command and executes a new transport command while the vehicle is running.

Stage Transfer: The vehicle is driven to the 'From' station according to the route specified by the MHS, and the vehicle is moved in front of the 'From' station until the transport command corresponding to the 'From' station is

received in a stopped state. The purpose of this function is to reduce the time from receipt of a From-To transfer command to the start of loading / unloading and to improve transfer efficiency by bringing the vehicle into the 'From' station where there is a lot of transfer in advance.。

Tools used: Visual Studio 2013, MHS emulator, Host simulator, Map view tool, MS Chart Languages: C++

MHS Software: software was the target software for HTL development. Main control functionalities of MHS are Transport Control, Vehicle Allocation Control, Area Control, Route search, Patrol Control, Parking control etc.

About HTL:

HTL Company Japan Ltd. is a global provider of unique customized solutions in the semiconductor and manufacturing industry. Established in 1994, their portfolio includes hardware and software solutions. Their hardware solutions include equipment for semiconductor and FPD mask making, additive manufacturing, strategic material deposition, scanning acoustic microscope, specialized purposes such as small satellite electronics and security monitoring as well as chemical materials. Their system integration software solutions have helped their customers with solutions in image processing, equipment automation, remote monitoring, device communication, web applications as well as EDA applications.

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