



LERCH BATES

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Destination Hall Call Systems

Abstract

Destination Hall Call Systems are now readily available from all four major equipment manufacturers as well as third party suppliers. Lerch Bates Inc. (LB) supports this technology if used in the proper application. Analysis of this type of control system must change from traditional round trip analysis techniques to Simulation analysis where results are evaluated based on new performance criteria: Average Waiting Time and Average Time to Destination. Such criteria provide a measurement that is more readily understood by clients than the traditional performance criteria.

Introduction

Innovations in elevator control technology have developed to the point of meriting serious consideration and recommendation to our clients. Destination hall call systems provide an enhancement to system performance beyond the up peak period. Arguments against this technology are becoming less valid as elevator designers and planners become better skilled at implementing this technology, and elevator users become more familiar with its operation.

The basis for this paper, its conclusion, and our firm's position is the outcome of in-depth product reviews, manufacturers' interviews, and independent studies performed by a team of LB consultants in New York, NY, from April 9-13, 2007. The product reviews included Schindler's Miconic 10 installed at the Marriott Marquis, 30 Rockefeller, 5 Times Square and 7 Times Square; and the Otis Compass installed at 7 World Trade.

Industry Trend

Destination based dispatching systems were introduced to the elevator market more than forty years ago when an Australian engineer was granted a patent in 1961 for his destination input device. The innovation was ahead of its time as the lack of microprocessor capacity limited its ability to conduct complicated dispatching algorithms in a timely fashion. However, by the late 1980's computing power enabled Schindler Elevator Corporation to introduce a modern version of this dispatching system. The product, Schindler's M10, has evolved from its original offering and has since been met with offerings from Fujitec, Kolmorgen, Mitsubishi, Motion Control Engineering, Otis Elevator, KONE and ThyssenKrupp.

Such control systems are becoming the global standard. It has been our observation, in markets such as Paris, London, and Tel Aviv, that the destination based dispatching system has become the standard over traditional two button systems. It is our expectation that this control system will become the system of choice in projects world wide. Our firm is adopting global performance standards and taking a proactive stance to make educated recommendations to our clients on this technology.



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Destination Hall Call Systems

Destination hall call systems replace the traditional two button hall fixtures with call registration terminals. The elevator user enters their desired floor destination at the call registration terminal and the terminal directs them to their assigned car. The call registration terminal replaces the function of a car operating panel. An alphabetical Elevator Identifier is located above each elevator entrance. The traditional hall lanterns or car direction signs are eliminated.

A full destination based dispatching system eliminates the car operating panel with the exception of the emergency communication devices. A concealed fire fighters panel is provided for emergency use.

A partial destination based dispatching system (up peak booster) is a blend of a destination system and a traditional two button system. A call registration terminal is provided at the main entry landing(s) while typical landings are provided with the up/down fixture button. The car includes a traditional car operating panel which will accept a car call after dispatching all main landing registrations.

Application

Lerch Bates has determined this type of control system is appropriate for both the new construction and the modernization markets. In most applications, destination hall call systems provide superior performance over traditional two-button systems. The primary benefits are increased handling capacity, a reduced Average-Waiting-Time and an improved Average-Time-to-Destination. Such improvements are gained by the elevator system making fewer local stops per trip which reduces total travel time. The reduced travel time results in more frequent dispatches from the main lobby which improves handling capacity.

Lerch Bates has concluded both the full (registration terminals at all floors) and up peak boosters (registration at main floor only) destination hall call systems are viable solutions for many office buildings where peak demand is during up peak. Where peak demand is two-way, destination hall call systems do not provide a significant advantage, however, such applications may be candidates for this control based on security needs or building marketing purposes.

We support up peak booster applications as such systems provide the grouping advantages of destination hall call systems while providing the flexibility of hall call re-assignment during two-way traffic. Such systems also address the potential cultural stigmatism of the complete destination dispatching system. Clients should be aware of the premium cost associated with such application due to the extra fixture devices.

The best application of a destination hall call system is an office building with a morning up peak. The "booking" of each passenger's destination via call registration terminals allow the system to group common and adjacent destination calls. The system also provides obvious benefits in applications where all cars in a single group do not serve all floors.



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Residential buildings are not the best application of this technology as car loads are typically small and the system does not realize the benefit of grouping passengers traveling to the same or contiguous floors. However, destination hall call systems do offer the advantage of inherent security and the ability for our client to differentiate their building with advanced technology.

In most hotel applications the benefit derived from destination hall call systems has yet to be proven for guest elevators. While certain properties with large service car groups may benefit from this control technology, the passenger elevators typically do not have the up peak volume to support this application. In addition, user familiarity has presented challenges in some applications; such challenges may be overcome as more applications are installed.



Advantages

The advantage of the destination based dispatching technology is the ability to group riders traveling to common or contiguous floor destinations. Grouping destinations reduces the system's probable stops during a peak period. This reduction improves departures from the main landing which ultimately increases handling capacity.

Destination hall call systems reduce the Average Time to Destination which provides improved service to upper floor tenants who pay higher rents. These tenants no longer experience repeat interruptions during their travel to their floor.

Destination hall call systems provide inherent, transparent security. Riders can be separated at the main lobby and assigned to their individual car. In addition to this elementary level of security, all manufacturers can communicate through a simple CAT5 connection to a third party security supplier providing user specific security systems.

Building planners do not always have the ability to accommodate all floors with all elevators in a group. In such instances, destination hall call systems can guarantee that passenger will always be assigned to an elevator that serves their desired destination.

Destination hall call systems allow the building planners to differentiate their building from their competition. This technology is the State-of-the-Art in elevator control. This technology provides unique call entry options and passenger experiences unavailable with traditional two-button systems.





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Disadvantages

Destination dispatching systems are “fully committed.” This eliminates the flexibility inherent with a two-button system to constantly re-evaluate allocations as new people are introduced to the system. The building planner must complete a more in-depth planning analysis to include review of two-way and down peak demand.

Early versions of these systems did not account for the “hitch hiker” or “bonus rider” – a person that did not enter their hall call destination when traveling in a group. Subsequent software improvements now utilize building learning software, load weighing, and applications of histograms to overcoming such riders cheating the system. Each manufacturer’s system addresses this challenge in a different manner; the effectiveness of such efforts has yet to be evaluated.

Perceived Arguments

Historically, arguments have been made against destination hall call systems due to a perceived learning curve challenge. Such arguments may have been based on observations from inappropriate destination based dispatching system applications. Further evaluation of such applications is required to substantiate or dispute this argument.

Average Waiting Time in the main lobby is not always reduced. For example, a waiting passenger may experience elevator departures from the main landing prior to arrival of their assigned car.

While this may be the case in some instances, Average Time to Destination is optimized in most applications. Therefore, applications of this system may result in a needed change in passenger expectations.

At the present time, destination hall call systems are marketed at a premium cost. Initial equipment costs can increase anywhere from 5% to 30% depending on the market climate and the number of lobby registration terminals. Such cost premiums are expected to decrease as competition increases. Ironically, the hesitation of building planners to utilize full destination systems over partial destination systems may also result in premium prices as the manufacturer must provide redundant fixtures.

Building planners have argued that destination hall call systems are not necessary in properly elevated buildings where the planner uses traditional Average Interval and Handling Capacity performance criteria. Improved analysis tools have both substantiated and minimized this argument. Simulation analysis does not conclude that destination hall call systems will reduce the number of elevators in a building. However, Simulation results do prove that this control technology will enhance the performance of the same number of elevators and will reduce the number of long waiting calls and will reduce the average trip time.

Application

Lerch Bates suggests destination hall call systems in the following situations:

1. When probable stops above main dispatch lobby are six or more landings served by three or more elevators.
2. When evaluation of traditional two button systems, as measured by traditional Average Interval and Handling Capacity, yield marginal results for the building type.



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3. When the building contains multiple loading lobbies or an intermediate destination floor (auditorium, cafeteria, theater, etc.) requiring special consideration.
4. When the Average Time to Destination (ATTD) results exceed 60 seconds with a conventional two-button control system.

Destination hall call systems begin to offer benefit when the probable stops exceed six stops above the entry landing. The system has little to no benefit for groups of less than three elevators. Consequently, we recommend consideration begin with a four car group serving ten landings or more.

In our opinion, destination based dispatching technology does not necessarily reduce the number of cars in a group. This technology improves handling capacity and reduces the number of long wait calls. In most cases, the number of elevators should not differ from those determined by a traditional Round Trip Time calculation.

Each manufacturer has a different method for identifying the mobility impaired passengers, as well as their interpretation of the judicial acts (ADA, EN 81-70, etc.) Our position is to specify compliance to the appropriate standard and to not make a subscription specification for this requirement. Special accommodation features provided by manufacturers include 1) Voice annunciation, 2) Extended door hold open time, 3) Assignment of elevator with sufficient space to accommodate mobility impaired person to allow for slower horizontal transfer time, and 4) audible indication of assigned elevator.

The maximum recommended number of elevators per group is eight elevators. Capacity and speed are not limited by this control technology.

Past applications have utilized a combination of signage and lobby registration terminal graphics to educate passengers on the proper usage of these systems. Future use of these techniques will be dependent on the location of the new application proposed. We recommend the use of "customized" touch screen video displays for the lobby registration terminals over a simple mechanical key pad. Such displays can combine architectural graphics and instructions to make a more user friendly elevator system.

Summary

Lerch Bates recommends the use of destination hall call systems for the right applications. The evaluation of such systems requires the use of Simulation analysis and the understanding of new performance measurements – Average Waiting Time and Average Time to Destination. In many properties the destination based dispatching system is our basis of design and specification over a traditional two-button system. We expect this technology to become the industry standard in the near future.

Historically, the common design and procurement method has been the solicitation of alternate bid prices for these types of systems. We anticipate this to change as the system becomes our basis of design and as the manufacturers choose to only tender their destination based systems.