Elevator Modernization Performance Charts

Elevator Performance Data for Representative Buildings
Before and After Modernization with
MCE’s M3 Group System Elevator Dispatching

Motion Control Engineering, Incorporated

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Purpose

This Technical Publication illustrates the dramatic elevator performance improvement realized using MCE’s M3 Group System. Each page summarizes actual project data.

Overview

These studies document system performance improvement by comparing average waiting time, before and after modernization, for a variety of projects.

Impressive reductions in hall call waiting time have been documented up to 83%.

While every building is different, the following collection of individual site studies is useful as a generalized predictive model for successful elevator system improvement — as measured by reduced average waiting time — applicable to similar buildings.

The actual performance improvement resulting from a particular scope of work is obviously based on many factors including: the type of building occupancy, current population and rate of growth, the efficiency and condition of existing elevator control and dispatching equipment, and the extent of modernization undertaken.
Chase Manhattan Bank
Worldwide Headquarters — Low Rise
Manhattan, New York USA

75%
Reduction in Hall Call Wait Time

Average Waiting Time

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Before Modernization</th>
<th>After Modernization</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30-9:30am</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>9:30-11:30am</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>11:30am-1:30pm</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>1:30-3:30pm</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>3:30-5:30pm</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

Equipment
Existing:
Otis gearless
Modernized with:
MCE IMC-SCR 12-pulse controls
MCE M3 Group Dispatcher

Traffic Study Detail
Pre-Modernization:
7/25/94 — Delta Traffic Analysis System
Post-Modernization:
1/27/97 — MCE CMS Traffic Analysis Reporting

Project Profile
Cars: 8
Floors: 11
Stops: 10
Speed: 500 fpm
Capacity: 3,500 lbs
Type: office building

Statistics
BEFORE
AFTER
Calls 3,712 4,443
Population 3,200 5,000+

Rev 5/26/98
Chase Manhattan Bank
Worldwide Headquarters — High Rise
Manhattan, New York USA

70%
Reduction in Hall Call Wait Time

Average Waiting Time

<table>
<thead>
<tr>
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<th>Before Modernization</th>
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<tbody>
<tr>
<td>7:30-9:30am</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>9:30-11:30am</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>11:30am-1:30pm</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>1:30-3:30pm</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>3:30-5:30pm</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

Equipment
Existing:
Otis gearless

Modernized with:
MCE IMC-SCR 12-pulse controls
MCE M3 Group Dispatcher

Traffic Study Detail
Pre-Modernization:
7/25/94 — Delta Traffic Analysis System

Post-Modernization:
1/27/97 — MCE CMS Traffic Analysis Reporting

Project Profile
Cars: 8
Floors: 52
Stops: 21
Speed: 1,200 fpm
Capacity: 3,500 lbs
Type: office building

Type: single tenant

Statistics

<table>
<thead>
<tr>
<th></th>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calls</td>
<td>3,130</td>
<td>2,496</td>
</tr>
<tr>
<td>Population</td>
<td>3,200</td>
<td>5,000+</td>
</tr>
</tbody>
</table>

Rev 5/26/98
CNN Center - North Tower
One CNN Center
Atlanta, Georgia USA

65%
Reduction in Hall Call Wait Time

Average Waiting Time

<table>
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<tr>
<th>Time of Day</th>
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</tr>
</thead>
<tbody>
<tr>
<td>7:30-9:30am</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>9:30-11:30am</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>11:30am-1:30pm</td>
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<td>10</td>
</tr>
<tr>
<td>1:30-3:30pm</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>3:30-5:30pm</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

Equipment
- Existing: Westinghouse gearless
- Modernized with:
  - MCE IMC-SCR 12-Pulse Controls
  - MCE M3 Group Dispatcher

Traffic Study Detail
- Pre-Modernization: 6/29/95 — EPTi Traffic Analysis System
- Post-Modernization: 4/9/96 — MCE Traffic Analysis Reporting

Project Profile
- Cars: 4
- Floors: 12
- Stops: 12
- Speed: 500 fpm
- Capacity: 3,000 lbs
- Type: office building, multiple tenant

Statistics

<table>
<thead>
<tr>
<th></th>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calls</td>
<td>2,413</td>
<td>3,258</td>
</tr>
</tbody>
</table>

Rev 9/10/98
Dupont Plaza
Office Building
Miami, FL USA

59%
Reduction in Hall Call Wait Time

Average Waiting Time

Equipment
Existing:
Otis gearless
Modernized with:
MCE IOS Intelligent Overlay System
MCE M3 Group Dispatcher

Traffic Study Detail
Pre-Modernization:
11/18/91 — Digimetrix Traffic Analysis System
Post-Modernization:
8/5/92 — MCE CMS Traffic Analysis Reporting

Project Profile
Cars: 3
Floors: 12
Stops: 12
Speed: 700 fpm
Type: office building
multiple tenant

Statistics
BEFORE  AFTER
Calls  1,712  1,739

Rev 5/26/98
Holiday Inn
750 Kearny Street
San Francisco, CA USA

68% Reduction in Hall Call Wait Time

Average Waiting Time

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<tbody>
<tr>
<td>7:30-9:30am</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>9:30-11:30am</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td>11:30am-1:30pm</td>
<td>40</td>
<td>10</td>
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Equipment
Existing:
Otis gearless

Modernized with:
MCE IMC-SCR 12-pulse controls
MCE M3 Group Dispatcher

Traffic Study Detail
Pre-Modernization:
10/29/96 — Digimetrix Traffic Analysis System

Post-Modernization:
5/4/98 — MCE CMS Traffic Analysis Reporting

Project Profile
Cars: 4
Floors: 31
Stops: 31
Speed: 700 fpm
Capacity: 2,500
Type: hotel

Statistics
BEFORE | AFTER
Calls   | 3,925 | 3,590

Rev 5/26/98
Office Building 9  
744 P Street — Low Rise  
Sacramento, California USA

54%  
Reduction in Hall Call Wait Time

Equipment  
Existing: Otis gearless  
Modernized with:  
MCE IMC-MG Controls  
MCE M3 Group Dispatcher

Traffic Study Detail  
Pre-Modernization:  
5/8/97 — EPTi Traffic Analysis System  
Post-Modernization:  
9/11/98 — MCE Traffic Analysis Reporting

Project Profile  
Cars: 3  
Floors: 11  
Stops: 11  
Speed: 500 fpm  
Capacity: 3,500 lbs  
Type: office building multiple tenant

Statistics  
Calls BEFORE 1,852 AFTER 1,995

MCE

Rev 9/17/98
Office Building 9
744 P Street — High Rise
Sacramento, California USA

Equipment
Existing:
Otis gearless
Modernized with:
MCE IMC-MG Controls
MCE M3 Group Dispatcher

Traffic Study Detail
Pre-Modernization:
5/20/97 — EPTi Traffic Analysis System
Post-Modernization:
9/4/98 — MCE Traffic Analysis Reporting

Project Profile
Cars: 3
Floors: 18
Stops: 11
Speed: 1,000 fpm
Capacity: 3,500 lbs
Type: office building
multiple tenant

Statistics
Calls BEFORE 1,607
AFTER 1,792

78% Reduction in Hall Call Wait Time

Average Waiting Time

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<td>1:30-3:30pm</td>
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<td>30</td>
</tr>
<tr>
<td>3:30-5:30pm</td>
<td>80</td>
<td>20</td>
</tr>
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</table>
Rutledge Building
Senate Street
Columbia, South Carolina, USA

Average Waiting Time

83% Reduction in Hall Call Wait Time

Equipment
Existing:
Otis gearless
Modernized with:
MCE IMC-SCR 12-Pulse Controls
MCE M3 Group Dispatcher

Traffic Study Detail
Pre-Modernization:
5/10/95 — EPTi Traffic Analysis Reporting
Post-Modernization:
9/24/98 — MCE CMS Traffic Analysis Reporting

Project Profile
Cars: 4
Floors: 13
Stops: 13
Speed: 500 fpm
Capacity: 3,000 lbs
Type: office building

Statistics
BEFORE    AFTER
Calls       1,900    2,536
Population  600      600

MCE
Rev 11/05/98
University of Minnesota  
Moos Tower  
Minneapolis, MN USA  

Equipment  
Existing:  
Westinghouse gearless  
Modernized with:  
MCE IMC-SCR 12-pulse controls  
MCE M3 Group Dispatcher  

Traffic Study Detail  
Pre-Modernization:  
3/19/96 — Digimetrix Traffic Analysis System  
Post-Modernization:  
3/18/97 — Digimetrix Traffic Analysis System  

Project Profile  
Cars: 6  
Floors: 19  
Stops: 18  
Speed: 700 fpm  
Capacity: 4,000 lbs  
Type: medical school  

Statistics  
Calls  
BEFORE 2,203  
AFTER 3,422  

70% Reduction in Hall Call Wait Time  

Average Waiting Time  

BEFORE Modernization  
AFTER Modernization  

70% Reduction in Hall Call Wait Time  

EQUIPMENT  
Existing:  
Westinghouse gearless  
Modernized with:  
MCE IMC-SCR 12-pulse controls  
MCE M3 Group Dispatcher  

Traffic Study Detail  
Pre-Modernization:  
3/19/96 — Digimetrix Traffic Analysis System  
Post-Modernization:  
3/18/97 — Digimetrix Traffic Analysis System  

Project Profile  
Cars: 6  
Floors: 19  
Stops: 18  
Speed: 700 fpm  
Capacity: 4,000 lbs  
Type: medical school  

Statistics  
Calls  
BEFORE 2,203  
AFTER 3,422  

Rev 5/26/98
About the M3 Group System

The **M3 Group System** is one of the industry’s most advanced multi-car group dispatching systems, using a powerful 32-bit RISC processor to perform real-time evaluation and analysis of building traffic in order to minimize waiting time. **MCE** software engineers developed mathematical models, using sequencing and queuing theory, to reduce the time required to serve each elevator call.

The **M3 Group System** compiles the required physical and statistical information, considers various parameters, then applies minimization algorithms in order to select the elevator car best suited to respond to each hall demand.

The **M3 dispatching algorithm considers parameters including:**

- Car position
- Car direction
- Car mode – automatic, inspection, independent, earthquake, fire service
- Car motion status (acceleration, high speed, deceleration)
- Car parking status (lobby/non-lobby)
- Anticipated direction of motion
- Door status (open, opening, closed, closing)
- Door opening time
- Door closing time
- Number of car calls
- Number of stops ahead
- Assigned hall calls
- Coincidence calls
- Load weigher status (if applicable)
- Program mode (balanced, peak)
- Late hall call threshold (per hall call, per direction)
- Number of cars in service

Lobby functions, parking floors and dispatching configurations are user defined. Unprecedented flexibility allows the system to be adapted to the unique demands of a particular building population. This same flexibility allows the system to be reconfigured for changing building populations and conditions as well.