Introduction to Robotic Parking Systems
THE PRODUCT

The compact Robotic Parking System offers:
• a very effective use of space
• about 4 times the amount of cars can park in the same area as compared to a conventional garage
• a state-of-the-art, computer-controlled and fully automatic storage facility
• greater security for people and their cars
• a “green” parking solution
• integrates with emerging technologies in transportation
ROBOTIC PARKING SYSTEM

DO MORE ... WITH LESS

THE PRINCIPLE:

Use half the space
– OR –
Double the parking.

Create green space and common areas.
Concrete Ramp Parking = 684 spaces
Robotic Parking Systems = 2314 spaces

The footprint is 328 feet by 168 feet. Conventional is 7 levels with a height of 97.44 feet. RPS is 11 levels with a height of 115 feet. Throughput is 425 cars / hour.
ROBOTIC PARKING SYSTEM
PARKING STORAGE
ROBOTIC PARKING SYSTEM
RETRIEVAL IN LOBBY
ROBOTIC PARKING SYSTEM

WALK TO THE CAR AND DRIVE OUT
ELIMINATES OPPORTUNITIES FOR ACCIDENTS AND CRIMES

NO ASSAULTS

NO VANDALISM

NO SCRATCHES

NO LONG WALKS OR SEARCHES
ROBOTIC PARKING SYSTEM

STACKER VS ROBOTIC PARKING

OLDER STACKER TECHNOLOGY

FASTER, MORE-EFFICIENT ROBOTIC PARKING SYSTEMS TECHNOLOGY
ROBOTIC PARKING SYSTEM

- High-level software design developed with GE Intelligent Platform Development Center.
- Multiple simultaneously operating robots.
- Highest peak traffic throughput in the industry.
- Patented throughout the world.
- Mature, system: over 23 years of experience.
ROBOTIC PARKING SYSTEM

• Independent third party verification.
• Peak traffic throughput capacity = total cars per hour in a combination of inbound and outbound traffic.
• Throughput capacity is more critical than single retrieval time in days to day operations.
• Al Jahra = 425 cph certified throughput (7 cars / minute)
• Average retrieval time = 177 seconds certified.
ROBOTIC PARKING SYSTEM

• Uses off-the-shelf parts with long history of successful operation.
• Pallets ensure no machinery touches the cars.
• Pallet tracks catch drippings to protect cars below.
• Autonomous machines. Performs separate x, y and z movements.
• No single machine failure will interrupt operations.
• Offers true redundancy.
ROBOTIC PARKING SYSTEM

- Interchangeable entry / exit terminals – dynamically either an entry or an exit.
- Two high resolution photographs on entry and exit for vehicle documentation.
- Backup generator with automatic start.
- Manufactured in the USA.
ROBOTIC PARKING SYSTEM

• Sophisticated diagnostics and high level warning systems.
• Modular capacity from 100 to more than 10,000 cars.
• Service plan based on threshold values for each component.
• Historical performance during our operation period is 99.9% uptime.
• User-friendly graphical user interface for operation.
ROBOTIC PARKING SYSTEM

• Two motion detectors in each terminal ensure no parking while the terminal is occupied.
• Mechanical and electronic guidance systems.
• Operations and maintenance manuals.
• Complies with the following quality standards:
  – NPA / AMPA
  – ASME Code B30.13
  – ETL or UL listed and approved.
  – NFPA 88A including ventilation requirements.
ROBOTIC PARKING SYSTEM

- Uses ultra high-end, fault tolerant Stratus servers (99.999% worldwide uptime.)
- Redundant servers operating in parallel.
- Mirrored memory.
- Hot swap capability – if one server fails the second server takes over automatically.
- No interruption of service. No loss of data.
GREEN GARAGE

MECSD certified that an installation can achieve about 17 LEED points. LEED, ESTIDAMA and other program estimates are similar.

TOXIC EMISSION REDUCTIONS / 1,000 SPACES PER YEAR:

- CO2 / Yr – 125,192 kg / 138 tons
- Carbon Monoxide CO / Yr – 7,014 kg / 15,463 lbs
- Hydro Carbons HC / Yr – 907 kg / 2,001 lbs
- Nitrogen Oxides NOx / Yr – 468 kg / 1,031 lbs
- Gasoline / Yr – 52,049 liter / 13,750 gal
- Brake Dust / Yr – 4,491 kg / 9,900 lbs
- Tire Dust / Yr – 44,452 kg / 49 tons
GREEN GARAGE / PARKSMART CERTIFICATION

We are working with this organization to add categories that are specifically related to automatic parking.

Some of these include:

• Elimination of toxic emissions
• Elimination of tire and brake dust
• Reduced gasoline consumption
• Reduced land consumption

Even under current scorecards we can contribute strongly to Parksmart Gold certification.
2018 GUINNESS WORLD RECORD

It became official in February, 2018. For the second time a Robotic Parking Systems' facility was awarded the Guinness World Record for the Largest Automated Parking Facility in the world - 2,314 spaces.
ROBOTIC PARKING SYSTEMS

PROJECTS

Designed and manufactured machinery and equipment for approximately 5350 spaces.
Delivered in 2002, it was the first automated parking system in the USA per the New York Times.

About 700,000 transactions in the automated garage show an "up time" over four years of continuous 24/7 operation of 99.99%.

These intensive operational conditions taught us exactly what elements could be improved. These improvements were incorporated into our next generations of installations.

<table>
<thead>
<tr>
<th>Number of Spaces</th>
<th>314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footprint</td>
<td>100 ft x 100 ft</td>
</tr>
<tr>
<td>Height</td>
<td>56 ft</td>
</tr>
<tr>
<td>Levels</td>
<td>7</td>
</tr>
<tr>
<td>Years Operated 24 / 7</td>
<td>16 years</td>
</tr>
<tr>
<td>Peak Traffic Capacity</td>
<td>122 cars / hour</td>
</tr>
<tr>
<td>Up Time</td>
<td>99.99%</td>
</tr>
<tr>
<td>Average Occupancy</td>
<td>99.5%</td>
</tr>
</tbody>
</table>
PINELLAS PARK, FLORIDA

Completed in 2006 and serves as employee parking and the company's research, development and testing facility.

<table>
<thead>
<tr>
<th>Number of Spaces</th>
<th>114</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Garage</td>
<td>RPS 1000</td>
</tr>
<tr>
<td>Footprint</td>
<td>97 ft x 72 ft</td>
</tr>
<tr>
<td>Height</td>
<td>32.5 ft</td>
</tr>
<tr>
<td>Levels</td>
<td>4</td>
</tr>
<tr>
<td>Entry / Exit Terminals</td>
<td>2</td>
</tr>
<tr>
<td>Years Operated</td>
<td>12</td>
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</tbody>
</table>
IBN BATTUTA GATE COMPLEX

The first automated parking garage in the Middle East.

Performance tests proved peak traffic handling of more than 250 cars per hour with the capability of 32 cars in motion at any one time.

As of 2018, this facility has a continuous operations track record of almost 9 years.

The *World’s Luxury Guide* awarded the Robotic Parking System at Ibn Battuta Gate the status of the most luxurious automated garage in the world.

<table>
<thead>
<tr>
<th>Number of Spaces</th>
<th>765</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Garage</td>
<td>RPS 1000</td>
</tr>
<tr>
<td>Footprint</td>
<td>276 ft x 98 ft</td>
</tr>
<tr>
<td>Height</td>
<td>57 ft</td>
</tr>
<tr>
<td>Levels</td>
<td>7</td>
</tr>
<tr>
<td>Entry / Exit Terminals</td>
<td>8</td>
</tr>
</tbody>
</table>

[Image of Ibn Battuta Gate Complex]
EMIRATES FINANCIAL TOWERS (EFT)

Designed and manufactured the machinery and automation.

EFT previously held the Guinness World Record for *Largest Automated Parking Facility* at 1191 spaces.

<table>
<thead>
<tr>
<th>Number of Spaces</th>
<th>1191</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Garage</td>
<td>RPS 1000</td>
</tr>
<tr>
<td>Footprint</td>
<td>320 ft x 120 ft</td>
</tr>
<tr>
<td>Height</td>
<td>72 ft</td>
</tr>
<tr>
<td>Levels</td>
<td>9</td>
</tr>
<tr>
<td>Entry / Exit Terminals</td>
<td>9</td>
</tr>
</tbody>
</table>
EMIRATES FINANCIAL TOWERS (EFT)
AL JAHRA COURT COMPLEX KUWAIT

2018 Guinness World Record holder for *Largest Automated Parking Facility*.

A 2314 space automated car park for Amiri Diwan Al Jahra Court Complex in Kuwait.

The facility is a combination of 684 concrete ramp parking spaces plus the 2314 automated spaces.

Certified peak traffic throughput of 425 cars per hour inbound / outbound and average single retrieval of 177 seconds.

<table>
<thead>
<tr>
<th><strong>Number of Spaces</strong></th>
<th>2350</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Garage</strong></td>
<td>RPS 1000</td>
</tr>
<tr>
<td><strong>Footprint</strong></td>
<td>328 ft x 168 ft</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>115 ft (RPS)</td>
</tr>
<tr>
<td><strong>Levels</strong></td>
<td>11</td>
</tr>
<tr>
<td><strong>Entry / Exit Terminals</strong></td>
<td>12</td>
</tr>
</tbody>
</table>
AL JAHRA COURT COMPLEX KUWAIT
EMERGING TECHNOLOGIES IN TRANSPORTATION

New technologies require that the garage of the future must be smart!
EMERGING TECHNOLOGIES – CASE

For higher levels of technology integration, we oriented our system around CASE (1).

**Connectivity:** Through Cimplicity® software from GE Automation, Robotic Parking System is connected and can receive and share information on an open network.

**Autonomous Driving:** We developed a partnership with Bosch to facilitate the parking of “autonomous driving cars.”

**Sharing and Services:** Communications exist to handle car sharing, fleets and servicing cars.

**Electrification:** Designed to include automatic electric car charging stations. The owner just plugs the cable in our entry terminal to the car.

(1) CASE strategy as defined by Mercedes-Benz at the Paris Automobile Show in 2016.
We feel that a garage offering features that accommodate emerging technologies will be the preferred garage of the future!
Robotic Parking Systems offer an innovative parking solution with premium advantages for everyone.

- More spaces and better parking experience.
- Better safety and security for individuals and their cars.
- Less congestion.
- True redundancy, speed and reliability.
- Proven in multiple facilities over more than 14 years.
- Automation is based on international automation experts – GE.
- Integrates with emerging technologies in transportation.
AME Info's Phil Blizzard reports on the opening of the 765 space Robotic Parking System...
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