Automated Guideway Transit System

KOBE BELCO AGT System

Yurikamome Tokyo

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KOBELECO AGT System

AGT System: In Brief

- A medium capacity, unmanned, guide-way transit, on rubber tires
- The first AGT system in Japan: EXPO'75 in Okinawa
- Current AGT projects in Japan: ‘Yurikamome’ extension in Tokyo, ‘Toneri’ line in Tokyo and ‘Port liner’ extension in Kobe

KRT-100 EXPO'75 site in Okinawa

YURIKAMOME Tokyo
AGT System: a Typical Application Range

(Applied passenger capacity is subject to change according to the conditions of each project.)
# KOBELCO AGT System

## Merits

<table>
<thead>
<tr>
<th>Item</th>
<th>AGT</th>
<th>Heavy Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Cost</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Carrying Capacity</td>
<td>Less than Heavy Rail</td>
<td>Large</td>
</tr>
<tr>
<td>Grade Ability</td>
<td>Steep</td>
<td>Gentle</td>
</tr>
<tr>
<td>Turning Radius</td>
<td>Small</td>
<td>Large</td>
</tr>
<tr>
<td>Vibration, Noise</td>
<td>Low</td>
<td>High</td>
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</tbody>
</table>
AGT System: Kobelco Projects History

- 1980
  - EXPO’75 KRT100
  - KOBE Port Liner
  - OSAKA Newtram
  - HIROSHIMA ASTRAM Line

- 1990
  - KOBE Rokko Liner
  - YOKOHAMA Seaside Line
  - HIROSHIMA Skyrail
  - Restoration construction of earthquake disaster

- 2000
  - Restoration
  - Renewal

- 2005
  - Extension to KOBE Airport
  - Chiang Kai-Shek Airport PMS
  - Renewal
  - Renewal
  - Extension to TOYOSU TOKYO

- 2006
  - Renewal
  - Renewal
  - EXTENSION

- 2007
  - TOKYO TONERI

- 2008
  - NAGOYA Guideway Bus

- 2009
  - Hong Kong New Airport APM
  - Renewal

- 2010
  - KOBE Rokko Liner
  - Renewal

- 2011
  - YOKOHAMA Seaside Line
  - Renewal

- 2012
  - HIROSHIMA Skyrail
  - Renewal

- 2013
  - HIROSHIMA Skyrail
  - Renewal

- 2014
  - NAGOYA Guideway Bus
  - Renewal

- 2015
  - Renewal
  - Renewal

- 2016
  - Renewal
  - Renewal

- 2017
  - Renewal
  - Renewal

- 2018
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  - Renewal

- 2019
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  - Renewal

- 2020
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- 2021
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- 2022
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- 2023
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  - Renewal
## AGT System: Kobelco Projects Outline

<table>
<thead>
<tr>
<th>Line</th>
<th>PORT LINER</th>
<th>SEASIDE LINE</th>
<th>ROKKO LINER</th>
<th>ASTRAM</th>
<th>YURIKAMOME</th>
<th>CKS SKY TRAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>KOBE</td>
<td>YOKOHAMA</td>
<td>KOBE</td>
<td>HIROSHIMA</td>
<td>TOKYO</td>
<td>TAIWAN</td>
</tr>
<tr>
<td>Length</td>
<td>6.4km</td>
<td>10.6km</td>
<td>4.5km</td>
<td>18.4km</td>
<td>12.0km</td>
<td>1.3km</td>
</tr>
<tr>
<td>Station</td>
<td>9</td>
<td>14</td>
<td>6</td>
<td>21</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Train Composition</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>1(North) 2(South)</td>
</tr>
<tr>
<td>Time required</td>
<td>18'00</td>
<td>25'10</td>
<td>10'00</td>
<td>LOCAL 35'00 RAPID 25'00</td>
<td>24'30</td>
<td>1'30</td>
</tr>
<tr>
<td>Minimum Headway</td>
<td>2'30</td>
<td>4'00</td>
<td>2'30</td>
<td>2'30</td>
<td>2'00</td>
<td>2'00</td>
</tr>
<tr>
<td>Capacity</td>
<td>75</td>
<td>75/74/66</td>
<td>60/54</td>
<td>50/44/40</td>
<td>55–60</td>
<td>69</td>
</tr>
</tbody>
</table>
KOBELEC AGT System

AGT System: Configuration

Rolling Stock: Rubber tire, Air Suspension

Track: Concrete running surface, Guide rail, Switch

Power Supply: Substation, Traction, Electric room, Power rail

Signal, Communication: ATP, ATO, ATS, Telecommunication system

Station: Ticketing System, Platform Screen Doors

Depots: Detention, Inspection lines, Maintenance facilities

ATP: Automatic Train Protection
ATO: Automatic Train Operation
ATS: Automatic Train Supervision
**KOBELO AGT System**

**AGT : specification I**

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Car Width</th>
<th>2.5 m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Car Length</td>
<td>8-10 m</td>
</tr>
<tr>
<td></td>
<td>Passenger capacity</td>
<td>45-100 passengers</td>
</tr>
<tr>
<td></td>
<td>Train</td>
<td>1-9cars</td>
</tr>
<tr>
<td>Minimum Headway</td>
<td>3.0 minutes-1.5 minutes</td>
<td></td>
</tr>
</tbody>
</table>
AGT : Specification II

Maximum Speed : 70 km/h

Acceleration, deceleration : 3.5 km/h/s

Emergency deceleration: 4.5 km/h/s

Train stop accuracy: ±30 cm

Min. turning radius: 100m (main track), 30m (side track)

Max. grade : 6% (main track), 9% (side track)

Max. Cant : 10%
Example: a typical configuration

KOBELO AGT System

Example: a typical configuration

Tokyo Yurikamome

① Power Collector  ⑥ Switch Guide Roller  ⑪ Maintenance Walkway
② Power Rail  ⑦ ATO Transponder  ⑫ Signal and Communication Cable
③ Guide Roller  ⑧ Data Communication Loop  ⑬ Power Distribution Cable
④ Guide Rail  ⑨ Running Surface
⑤ Feeder Cable  ⑩ Telephone
Example: Track and Switch

- A track of flat concrete running surface for comfort ride
- H shaped guide-rail to minimize lateral vibration
- An automatic switch with fixed and movable blades
Example: Traction and other power collection

Vehicle propulsion and auxiliary power go entire length of guideway.
System Engineering: ATC (Automatic Train Control)

- Automatic Train Protection System
  - Train Detection
  - Collision Prevention
  - Speed Control
  - Route Interlock

- Automatic Train Supervision System
  - Schedule Management
  - Traffic Supervision
  - Route Control
  - Train Remote Monitoring and Control
  - Operation Record
  - Passenger Information Control

- Automatic Train Operation System
  - Driving Start & Stop
  - Door Open & Close

- Platform Screen Door

- Station Equipment

- Depot Control System

- Disaster Monitoring System

- Power Supply Control System
Example: Station equipment & communication

Automatic platform screen doors

The automatic platform screen doors open automatically in harmony with train doors, to allow passengers to get on board/off board.

The platform screen doors are higher than the train doors and open wider to absorb train stop margin.

Door monitoring

The video surveillance system with a closed-circuit television (CCTV) and central control monitors cover all station platform doors areas.
Example: Maintenance and storage

Functions are:

- Departure test,
- Cleaning, washing and routine maintenance of the vehicles, such as
  - Body and interior parts
  - Propulsion equipment
  - ATP and ATO equipment
  - Air conditioning equipment
  - Brake system
KOBELEC AGT System

Rokko-Liner
Thank you for your attention!