

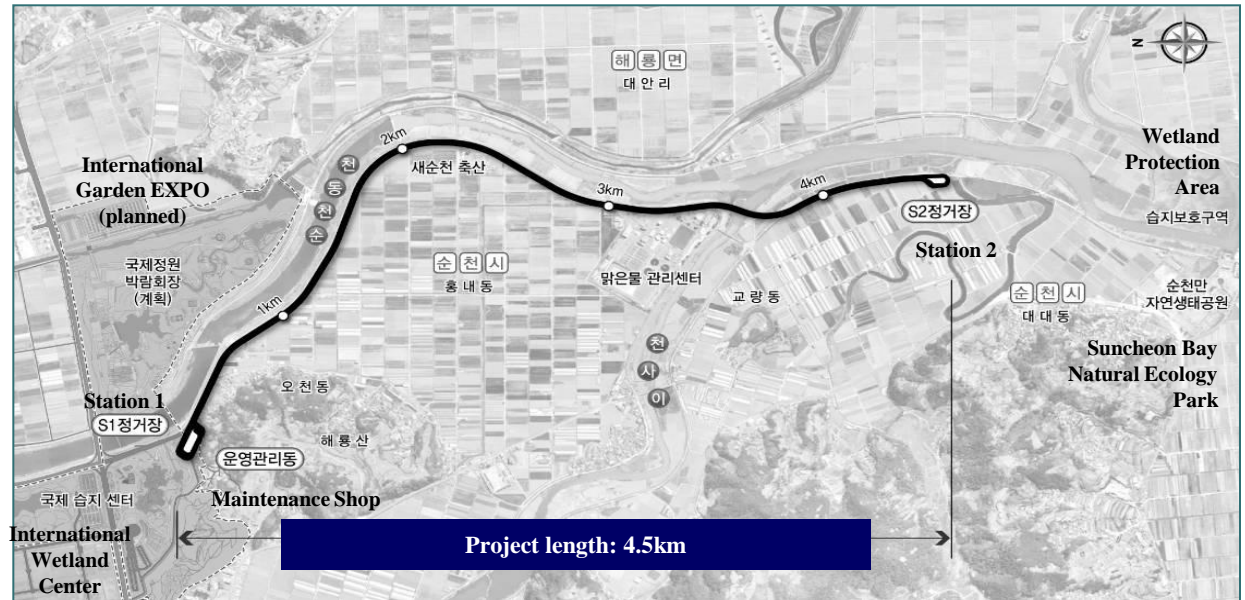
SunCheon PRT : SkyCube Project Overview & Operation Status



October 2015

2015 Podcar City 9th

Project Location : SunCheon



Garden Park & SkyCube Operation

Items	Description
Operator	Eco-Trans (http://www.skycube.co.kr)
Stakeholder	POSCO (http://www.posco.com)
Availability	Over 99.5% (based on APM standard)
Ridership	Average 1,000~1,500/day
2014	570,000 passengers (8 months)
Fare	8,000 KWON (7 USD)
Operation Time	09:00 ~ 19:00 (summer), 09:00 ~ 18:00 (winter)



[Ecology Park www.suncheonbay.go.kr]



[Garden Park www.segardens.or.kr]

SkyCube Project Overview



Items	Description
Name	Suncheon Wetlands SkyCube
Client	Suncheon Eco-Trans
Project Type	BOT (Build Operation Transfer) 30 Years
Function	Connects Suncheon 'Dream Bridge' with Suncheon Bay Ecological Park
Status	Live operation from September 2013 (Revenue service from April 2014)
Construction Period	2011.06 ~ 2013.05 (23months)

SkyCube Description

Items	Description
Description	<ul style="list-style-type: none">• 4.6 km of elevated, bi-directional guideway• 40 vehicles with capacity for 10 passengers (6 seats) plus luggage / baby buggies• Following international Rail Vehicle Accessibility Regulations (RVAR)• Level access, bi-parting doors, ease of access also for mobility impaired
Capacity	1,500 PPHPD (passengers per hour per direction)
Supplier	E&M : POSCO ICT Co. Ltd (Vectus Co. Ltd.) / Track : POSCO Engineering



Functional Description

- Vehicles captive on the running rails
- Speed around 40 km/h (25 mph)
- Asynchronous control
- Minimum headway 4 seconds
- Distributed control system
- Current collection along guideway
- CCTV and 2 way communications
- Heating/cooling/air conditioning (HVAC)
- Passenger information displays
- Concrete pillars and beams, spans 30 m (50 m over river)

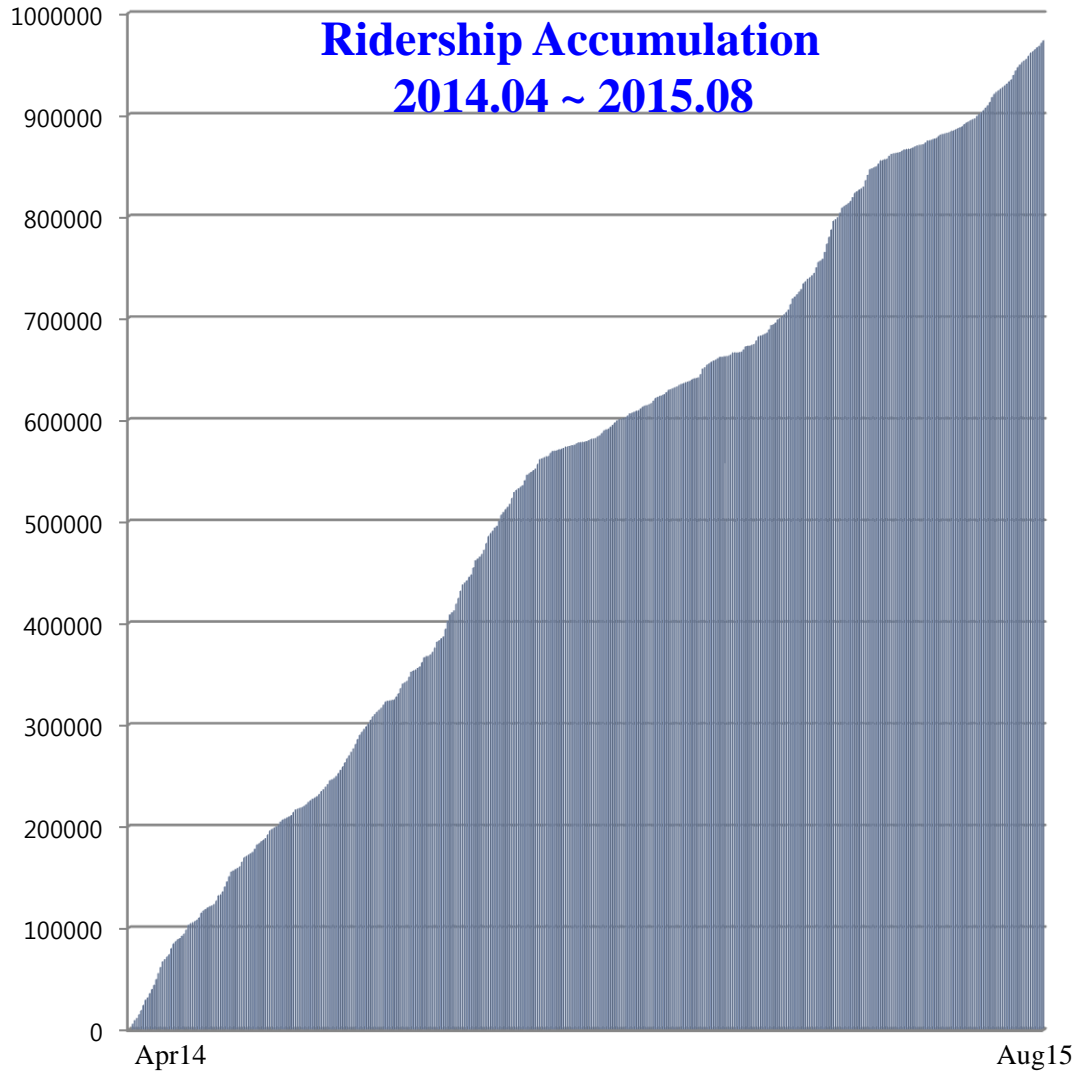


SkyCube O&M Summary

Items	Description
Operation staff	30 People (Variable)
Headway/Speed	Minimum 4 second / 50 km/h
Control Type	RF-CBTC Moving Block System
RF-CBTC	5.8 GHz ISM Band
Communication	TETRA Radio (Rental), FOCS and other
PSD	Platform Screen Door Safety System
Propulsion	Steel wheel (Urethane cover) with rotation motor



SkyCube Ridership from revenue service



SunCheon SkyCube	
Total Ridership	972,608
Max Ridership / Day	8,592
Max Capacity (PPHPD)	1,500
Max Monthly Availability	99.97%
Data Acquisition Period	2014.04 ~ 2015.08

SkyCube Vehicles & Stations



PRT Model for SunCheon



Garden Station



Moonhagwan Station



Depot Supporting Facility (parking 32 vehicles)

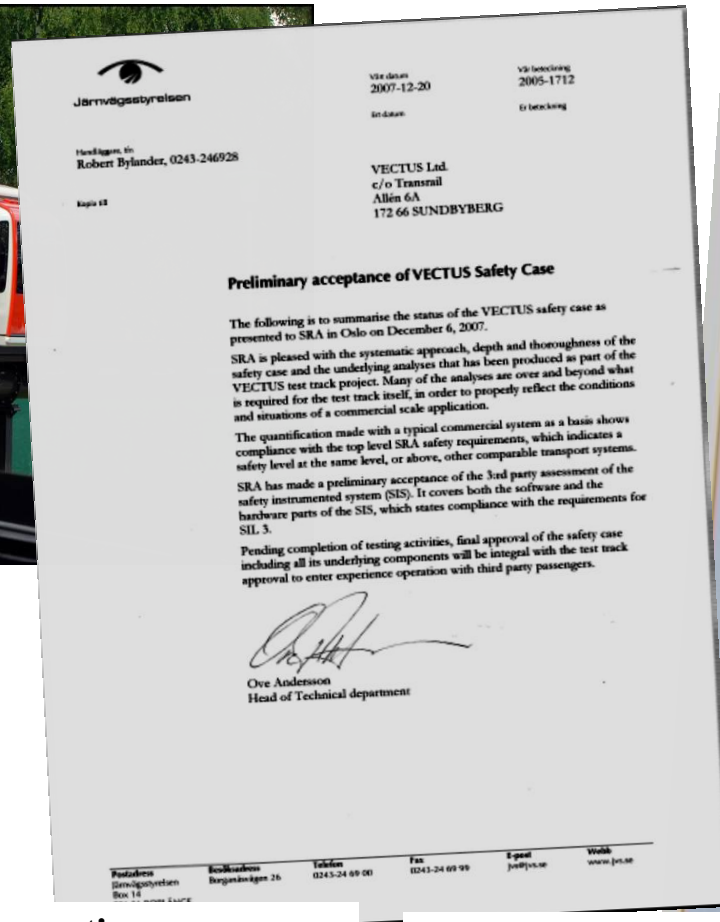


Station and Vehicle Queue

SkyCube Operation Site



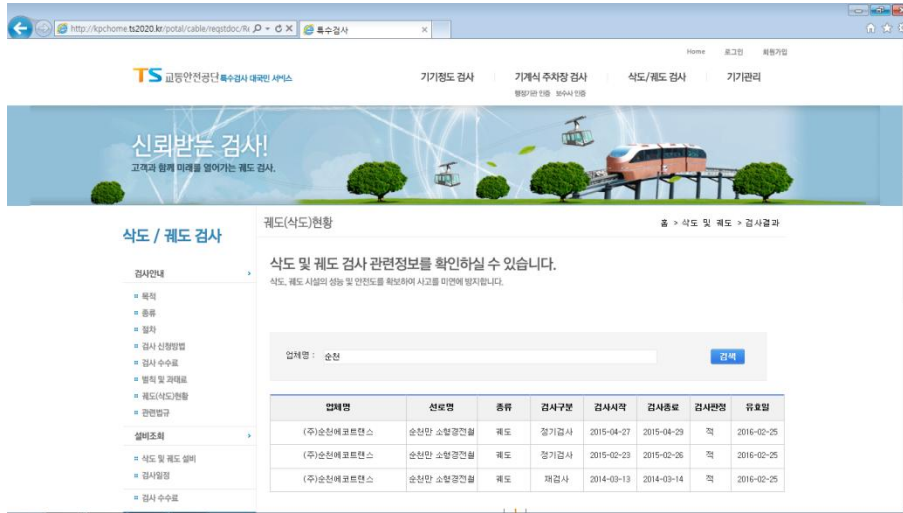
VECTUS PRT



- Fully automated driver-less operation.
- All functions have been tested
 - Merging at full speed
 - 4 seconds minimum headway
 - Speed > 50 km/h

- Approved by Swedish Rail Agency
- Following international standards (from railway, mass transit)
- Considered the current ASCE APM standards.
- Safety case (3:rd party assessment of Safety Integrated System) based on EN 50126 / IEC 62278 (RAMS-standard) and IEC 61508 for electronic safety systems.

Safety Certification



[Suncheon Sky-Cube Korea Government : Transportation Agency Safety Confirmation]

Industry Safety Standards Examples

- Functional Safety in Process Industry
: IEC61508
- Avionics/Aerospace
; Do-178B/C/ED-128, DO-254
- Medical
; FDA 510(k), IEC62304, IEC60601

Lloyd's Register Safety Certification ➔

SAFETY CERTIFICATE

FOR SAFETY INSTRUMENTED SYSTEM OF PERSONAL RAPID TRANSIT IN SUNCHEON CITY, KOREA

To : SC-PRT (Suncheon Eco Trans Co., Ltd.)
435, Gangbyeon-ro, Suncheon-si, Jeollanam-do, 540-956, Korea

Dear Sir/Madam,

At the request of SC-PRT(Suncheon Eco Trans Co., Ltd), Lloyd's Register Rail has conducted Independent Safety Assessment (ISA) on the Safety Instrumented System (SIS) of Suncheon Personal Rapid Transit (PRT) for the purpose of examining the compliance of the equipment to the international standard IEC 61508:2002 and the suitability of the equipment for safe operation.

PROCESS :

The ISA has been conducted a combination of document assessments, on-site audits, interviews, and observations throughout the whole project life cycle to gain confidence that the safety management activities undertaken by SC-PRT comply with the international standard IEC 61508:2002.

SYSTEM UNDER CERTIFICATION :

The SIS consisting of Safety Zone Controller, Safety Switch Controller and Safety Vehicle Controller.

VALIDITY :

Valid until such time as changes or modifications are made to any part of the system design, rating and operational parameters as described in this certificate.

APPLICATION CONDITIONS AND CONSTRAINTS :

The safety assessment only relates to the SIS of PRT developed by SC-PRT to be operated at Suncheon City in Korea. The application relates to the system documentation and development documents listed in the Functional Safety Assessment Report [CP00357RKC150420 Functional Safety Assessment Report Issue 05, dated 20 April 2015].

CONCLUSION :

Lloyd's Register Rail performed ISA on the Specific Application of the SIS on the Suncheon PRT and certifies for commissioning that the safety functions of the SIS have achieved the requirements specified in IEC 61508:2002 standard subject to resolution of the items contained in the APPLICATION CONDITIONS AND CONSTRAINTS above.

Certificate No. : CP00357CIC150422

Lloyd's Register Asia(Rail)
22/F, Dah Sing Financial Centre,
108 Gloucester Road
Wanchai, Hong Kong
www.lr.org

Seoul office
11/F, Singsong Bldg, 25-4, Yeouido-dong,
Yeongdeungpo-gu, Seoul 150-010, Korea
www.lrail.com

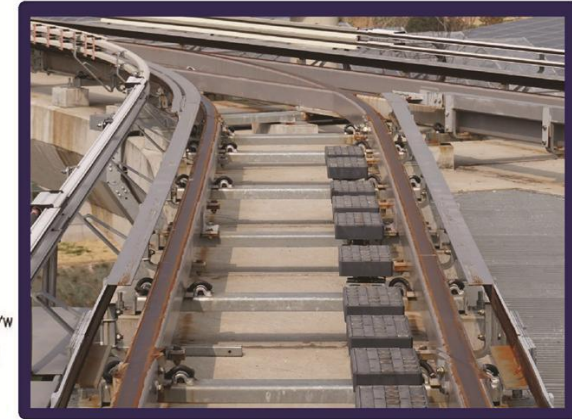
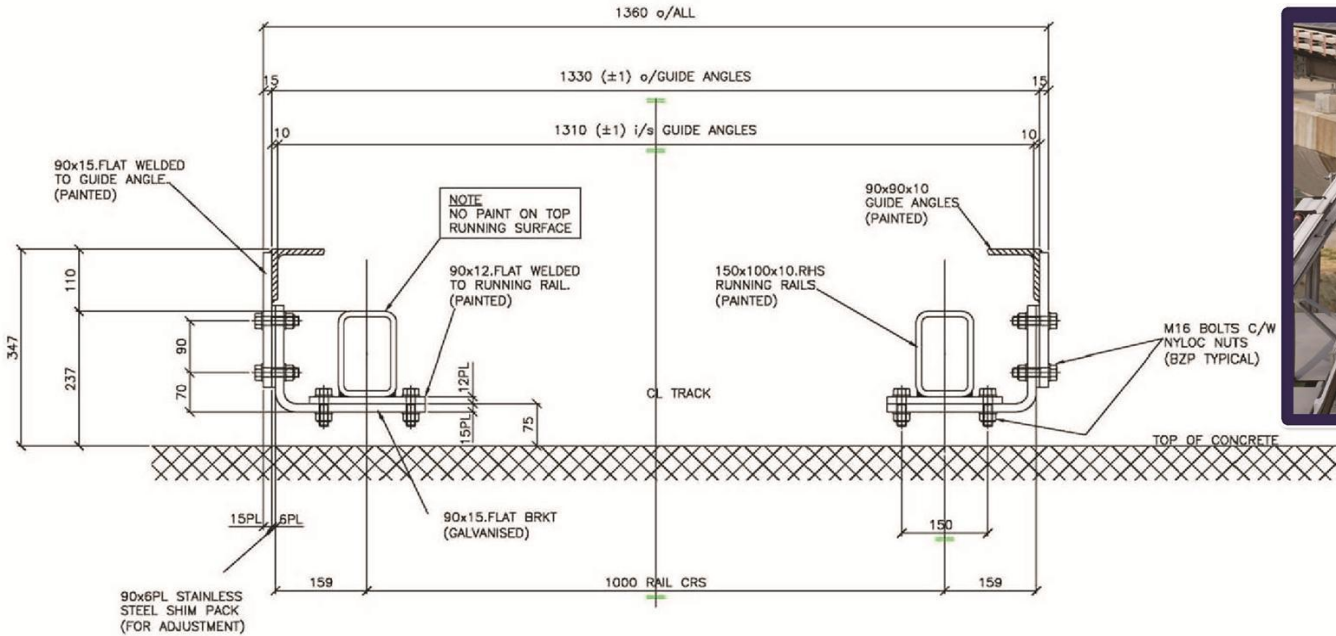
Telephone +822 782 1644
Facsimile +822 782 1659
Email jeong-rok.choi@lr.org
Date 22nd April 2015
Your ref N/A
Our Ref 15-152 / CP00357

Iain Carmichael
Managing Director
For and on behalf of Lloyd's Register Rail (Asia) Limited

Working together for a safer world

Lloyd's Register and variants of it are trading names of Lloyd's Register Group Limited, its subsidiaries and affiliates. Lloyd's Register Asia (Reg. no. 23593 RJ) is an Industrial and Provident Society registered in England and Wales. Registered office: 71 Fenchurch Street, London, EC3M 4BS, UK. A member of the Lloyd's Register group.

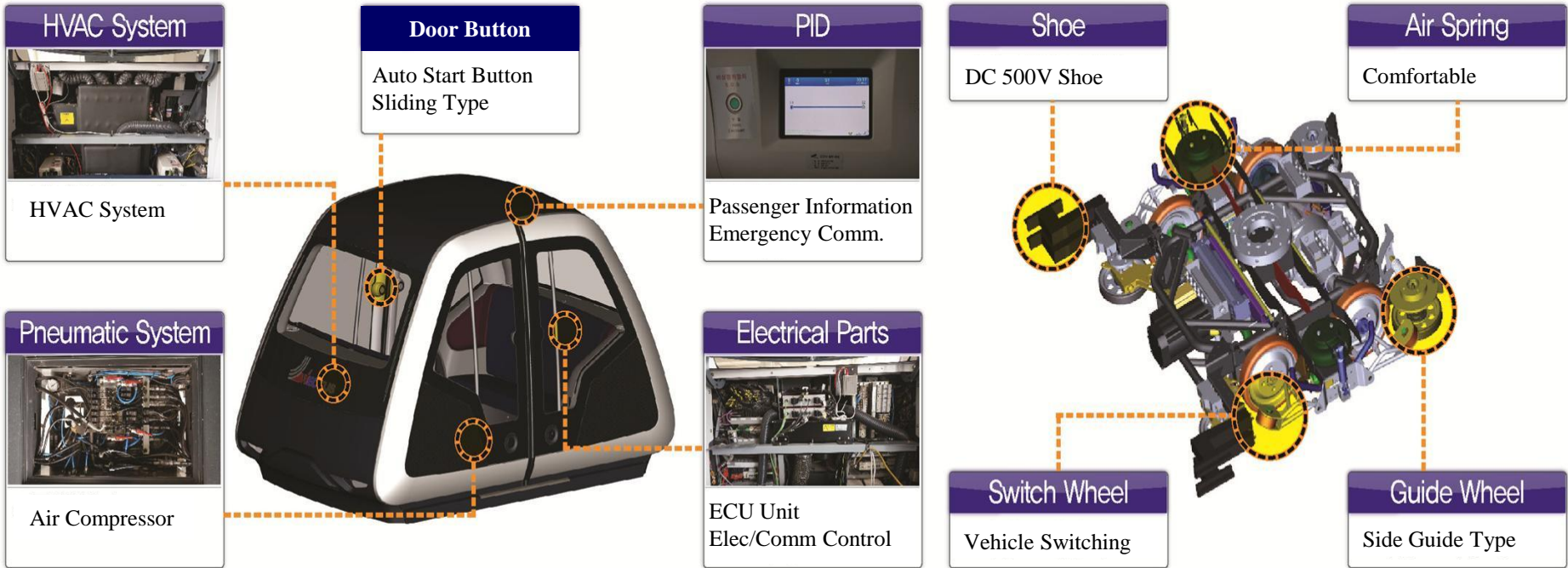
SkyCube Track



SECTIONAL ELEVATION ON TRACK

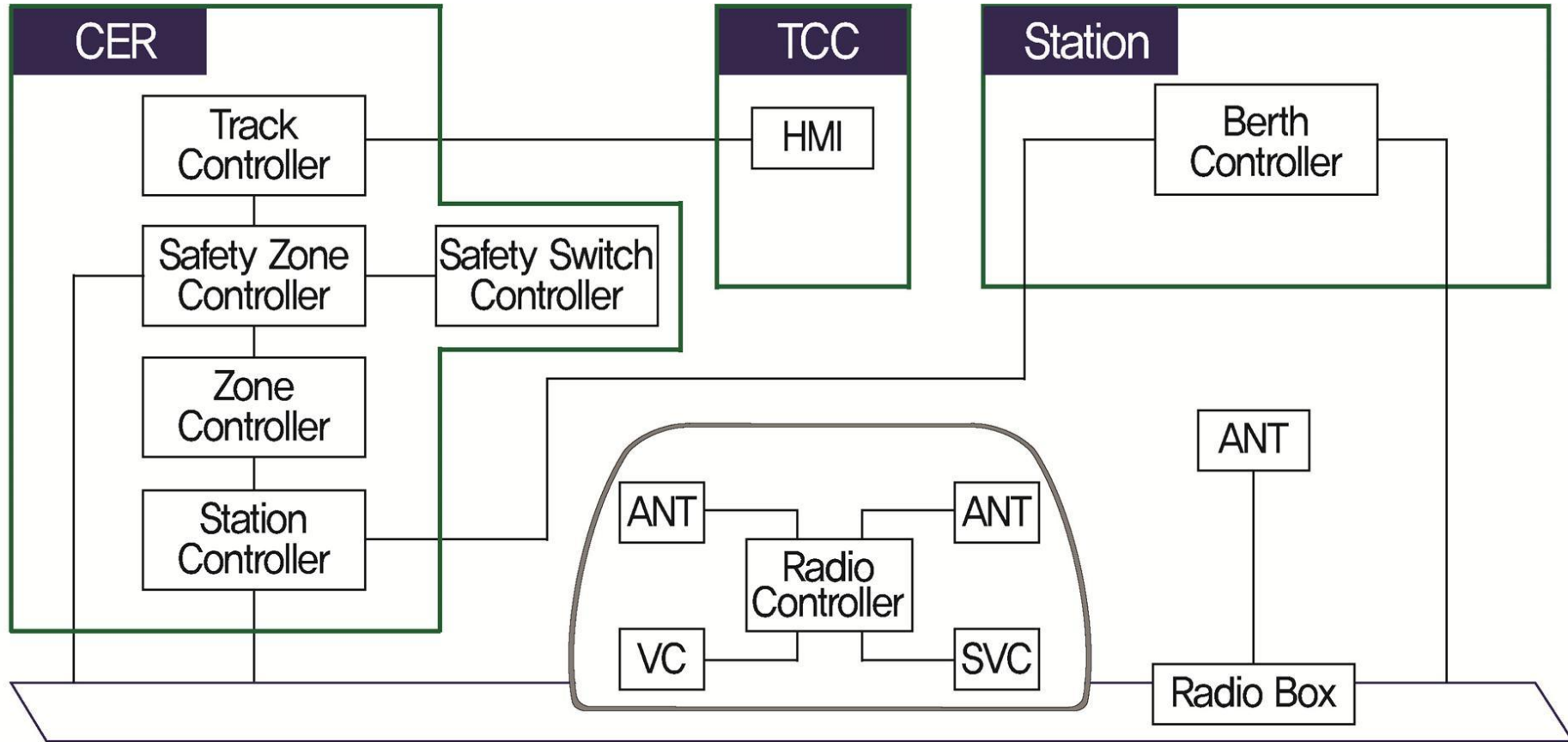
Items	Description	Items	Description
Gauge	1,000mm	Track	Ferroconcrete
Running Rail	Rectangular steel pipe	Switching	Vehicle Switching
Guide Rail	“┌” type steel plate	Grade	3.5% (10.0% performance)

SkyCube Vehicle Specification



Items	Description
Size	L 3,670 * W 2,100 * H 2,500 mm
Weight	Empty 2.3 ton / Full 3.2 ton
Gradability	10% (with LIM motor)
Speed	Max 60 km/h, Operation 40 km/h
Acc/Decel	2.0 m/s ² (emergency up to 6 m/s ²)

SkyCube Vehicle Control

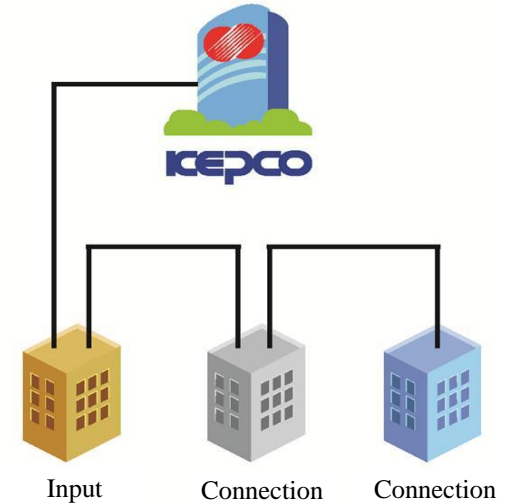


Items	Description
Vehicle Controller (VC)	Propulsion, Switching, Door Control and vehicle control
Safety Vehicle Controller (SVC)	Only Safety functions (separated from VC)

SkyCube Traction Power Supply

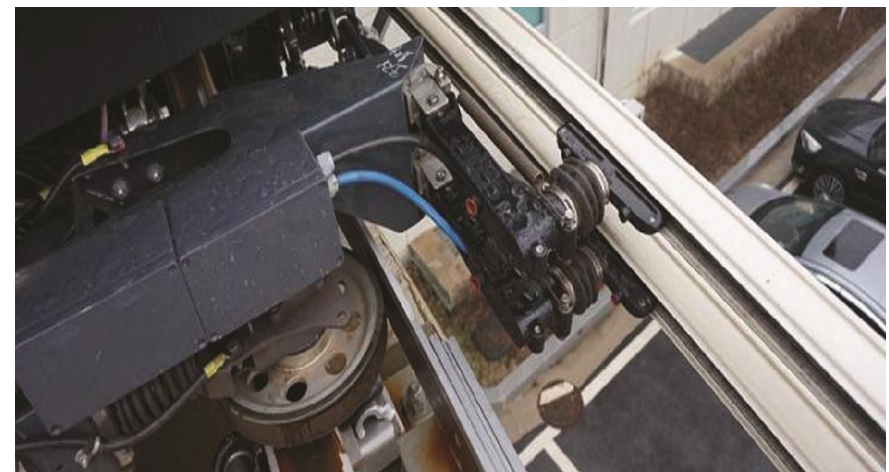


Line Connection Power Distribution System



Items	Description
Incoming Power	AC22.9kV
Sub-station	3 sub-stations
Traction Rectifier	6 phase 12 pulse
Transformer	300kVA
Service Rectifier	200kVA
Emergency Generator	63kVA
Output : Traction Power	DC500V

3rd /4th Rail Power Supply System



Thank you !



Contact Point :
Kyu-Sang Choi (KS.Choi)
Bid Manager /
System Integration Engineer
POSCO ICT Co., Ltd
Railway Business Group
rametal.choi@gmail.com
kyusang.choi@poscoict.com
M : +82-10-8917-4697
T : +82-31-723-2587