

Eco-friendly & Futuristic SMART MONORAIL



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Green & Future

Closer to nature People become happier

The beauty of nature as it is...

Dream of transportation that you can enjoy

convenience and comfort, will be realized from now on.

SMART Monorail created by WOOJIN Industrial Systems Co., Ltd.

will give the present of the great beauty to the people

dreaming a happy future in the green natural environment.

WOOJIN's History

WOOJIN Industrial Systems Co., Ltd. has made the best effort to supply safe and comfortable New Transit systems, as the leading role of eco-friendly green-growth age.

- 1974 Established WOOJIN Industrial Systems Co., Ltd.
- 1993 Manufactured Static Inverter (GTO/PTR Type) and VVVF Converter/Inverter (GTO Type)
- 1996 Obtained ISO 9001 certificate (Issued by BVQI)
- 1997 Manufactured Static Inverter (IGBT Type)
- 1999 Developed On-board Equipment for Korean Standardization EMU

- 2001 Manufactured and delivered Light rail Vehicle for Busan Metro Line 4
- 2005 Obtain the certificate of ISO 14001 (issued by BVQI)
- 2008 Started to develop the SMART Monorail
- 2008 Signed a monorail Supply contract with Hitachi, Ltd. for Daegu Metro Line 3
- 2009 Manufactured and delivered Light rail vehicle for Busan Metro line 4

- 2010 Completed manufacturing and delivering of rubber tired AGT vehicle and E&M facilities for Busan Metro line 4
- 2010 Completed SMART Monorail development
- 2010 Selected as the preferred bidder for the rubber tired AGT vehicle supply contract Shinlim Line&Dongbuk Line in Seoul



Safe & SMART

Pursue perfection, from customer’s safety and comfort to elegant exterior

WOOJIN Industrial Systems Co. Ltd. has put all capability and technology into the SMART Monorail from manufacture to operation. We will provide the SMART transportation environment that has an elegant design and also various amenities capable of being in harmony with nature and city, as well as customer’s safety and pleasantness.

SMART MONORAIL

Supports various operation mode

- Supports manned and unmanned operation
- Supports various headways

Guarantees the best stability

- Applied stability verified by the straddle type bogie system
- Applied flame retardant seats and interior material
- Adopted safe and quick emergency escape system (Optional)
- Equipped tire pressure detection system to prevent the flat tire accident

Provides system appropriate to purpose of use

- SMART system that corresponds to all standards

Vehicle Dimensions

Item	Unit	Specifications		Note
		for City	for Tour	
Vehicle Composition	Car/Train set	2~6cars / 1 train		
Bogie Type	—	single bogie		1car 2bogie
Car body Dimensions	Length(Mc)	mm	6,750	
	Length(M)	mm	6,750	
	Width	mm	2,400	
	Height	mm	3,393	From rail surface
Track Type	—	Steel box beam		
Maximum axle load	kg	5,500		
Max. speed in performance	km/h	50	30	
Max. speed in operation	km/h	40	25	
Maximum acceleration	km/h/s	3.5	2.5	
Deceleration	Normal	km/h/s	3.5	2.8
	Emergency	km/h/s	4.5	2.8
Max. gradient	%	60		
Min. curve radius	m	30		
Supply Voltage	—	DC 750V		

Design

Adopted elegant exterior design

- **Exterior Design** : Symbolizing “the arrow of the future” flying dynamically
- **Interior Design** : Interior considered Passenger convenience and to secure a clear view

※ Customized Interior/Exterior design suitable for applied route

Convenience

Equipped with various customer-friendly Convenience

- Manufacture not only urban vehicles but also amusement area vehicles
- Expand Convenience considering disabled person
- **Optional** : LED Indicator, LCD Indicator, LED fluorescent light, Mist Window, Spiral Shooter etc.

System Standards

Item	Detailed Specifications	Note
Vehicle Type	Straddle type small Monorail	
Car body	Aluminum	Realization of lightweight with extruded material application
Vehicle Interior	Flame retarding material	Satisfies Metropolitan Transit
Operation mode	ATO automatic operation/ One man operation	
Electric Power Supply	Rigid Power Rail on Side	
Traction Motor	3-phase Induction Motor	
Propulsion Control Device	VWF Inverter	
Bogie Type	Rubber tired single axle bogie	• Bogie system developed by domestic technology • Cost-reduction by easy maintenance

Passenger Capacity

Item			Specifications	Note		
Passenger/car	MC	Nominal Passenger Capacity (3-per/m ²)	29per Seat:7 / Standee:22	62kg/person		
		Full Load Passenger Capacity (6-per/m ²)	52per Seat:7 / Standee:45			
	M	Nominal Passenger Capacity (3-per/m ²)	37per Seat:16 / Standee:21			
		Full Load Passenger Capacity (6-per/m ²)	58per Seat:16 / Standee:42			
Headway	No. of train	Loading Capacity				
min	per hour	2car-Train	3car-Train	4car-Train	5car-Train	6car-Train
Passenger/train		104	162	220	278	336
2	30	3,100	4,860	6,600	8,340	10,080
3	20	2,080	3,240	4,400	5,560	6,720
4	15	1,560	2,430	3,300	4,170	5,040
5	12	1,248	1,944	2,640	3,336	4,032



For Next Generation

Administrators will be satisfied with WOOJIN's SMART Monorail.

Passengers will be impressed with the safety.

WOOJIN SMART Monorail for the next generation will satisfy administrators first with its great economics, also will be harmonized with the ambient environment by eco-friendly system.

And passengers will be satisfied with complete safety.

SMART Monorail, it is the choice for the brighter future.

Special
Feature
01

Monorail specialty

SMART Monorail is economically feasible.



Low
construction
cost

- Reducing the construction cost by sliming track structure.
- The three-dimensional space using of the ground.
- Minimizing construction cost by completing the construction in a short period of time.
- Maximizing business effects by composing a flexible system which is appropriate for a route.

Minimize
operating
expenses

- Reducing operating expenses by developments of the Common technology and localizing.
- Establishing the system which can minimize operating expenses in accordance with the manned or unmanned operation of a slimmed monorail.
- Less operating expenses than other systems due to convenient and simple maintenance for vehicles.



**Economics
secured system**

Economics securement

- Minimize environmental effects by flexible route design
- Flexible vehicle operation by demand
- Shorten construction period through factory manufacture of track structure
- Minimize depot space with compact sized vehicle
- Low maintenance cost

Special Feature 02

Monorail specialty
SMART Monorail aims for Eco-Green



Eco-friendly system

- Realized Eco-friendly pollution-free using pollution-free electric power energy.
- Low Carbon Eco-friendly transportation has no air pollution-environmental pollution.



Excellent in low noise

- Reduced the noise of on-board equipment and wind noise by installing the under skirt.
- Used excellent sound proofed interior material for pleasant indoor environment.
- Realized low vibration/low noise with excellent flatness steel track.



Flexible route design

- It is possible to design a flexible route which does not destroy the environment with an excellent running capacity.
- Harmony with a cityscape by a slim and sophisticated structure which considers the view.



System has a flexible route design

Flexible route design

- Possible to design a short curve and steep grade by the 30m a minimum curve radius and the 60% a maximum Steep gradient.
- Applied slim structures by less than 5.5 ton axle load.

Excellent low noise

- Applied the Noise Criteria of Urban Railway for a pleasant environment.
- More comfortable ride by realizing low vibration/low noise.

Special Feature 03

Monorail specialty
SMART Monorail considers the safety and reliability as the most important thing.



System secures a reliability

- Applied the on-board equipment which had been developed and provided for domestic and foreign urban railways.
- Applied the engineering & design of the Korean standard unmanned LRV(K-AGT) and the manufacturing technology.
- Completed a verification through the design, manufacturing and testing for the SMART Monorail prototype car.



Excellent hazard preventive system

- Prevents an accident caused by a flat tire with a tire pressure detection system.
- Using Flame retarding interior materials and fire detection system.
- Installing of fire extinguishers, emergency communication and ventilators.



Safe and practical bogie system

- Completely removed the risk of derailment by installing driving wheels, guide wheels and safety wheels during operation.
- Realized a comfortable and silent ride by installing shock absorbers to guide wheels and safety wheels.
- Easy to maintain tires without separating bogies from the car.



Emergency response system

Fire-resistant systems

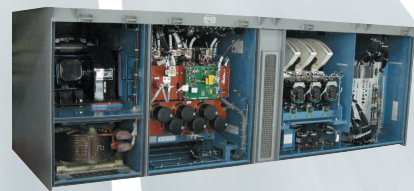
- To prevent the spread of fire, adopted Flame retarding interior materials.
- Applied emergency communication system for emergency call in case of fire.
- Installed fire extinguisher for initial extinguishment.
- Installed emergency ventilators for emitting toxic gas.

Fly on the Green

Soaring feel passing through the wind, it shows the dynamics of the SMART Monorail.

During standby, SMART Monorail consisted of a beautiful curve, expresses itself a smooth image which becomes a dynamic and strong feelings as a flying arrow as soon as it runs.

Unparalleled design aesthetic is one of the reasons why SMART Monorail has been selected.



VVVF Inverter



Auxiliary Power Supply (SIV)



Train Control and Monitoring System (TCMS)



Information Displayer



Exterior Design

• Various Design

Applied a suitable design for applicable route such as Urban and amusement areas.

• Car Body

Future-oriented design which considered the feature of the aluminum car body.

Interior Design

• Pleasant Interior

Secured a clear View by applying large windows. Elegant interior design for passengers convenience.

• Interior Material

Realized low vibration/low noise. (satisfied the criteria of Urban Railway)
Applied seats and interior material which used incombustible material that complied with a safety standard.

• Driving console(unmanned operation)

Advanced design in consideration of automated unmanned operation for passengers wide visibility.
Compact driving console equipped with necessary equipment for emergency operation by an operator.

• Driving console(manned operation)

Secured a convenient operation and forward visibility for a driver.