

HSST

Electromagnetic Levitation
Linear Motor Car

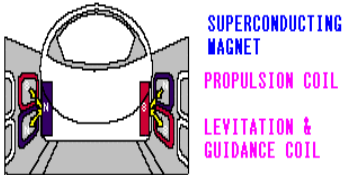
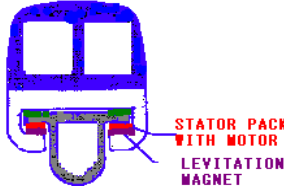
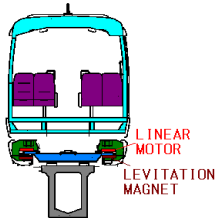
HSST Systems International Inc.
ITOCHU International Inc.



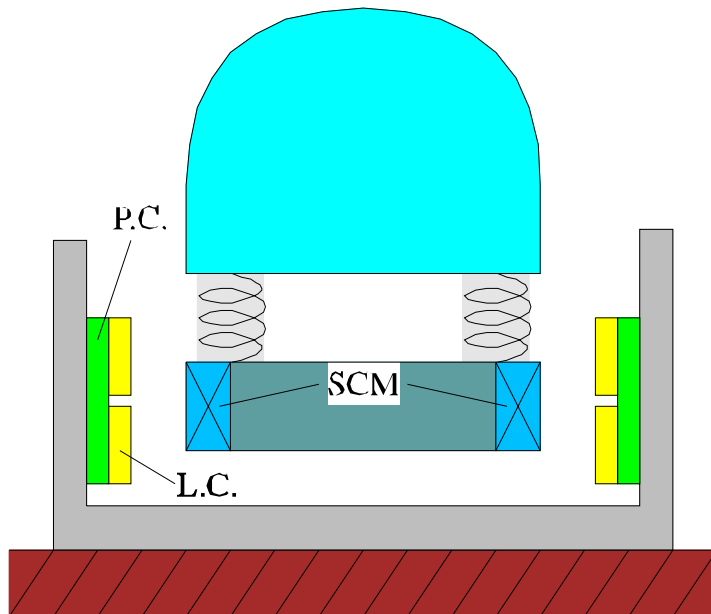
Urban MAGLEV “HSST System” offers
many attractive benefits including:

- ❖ The ability to operate in challenging terrain with steep grades, tight turns, all weather operation, rapid acceleration and quiet operation
- ❖ A cost-effective transit option with remarkable low “Life Cycle Cost”

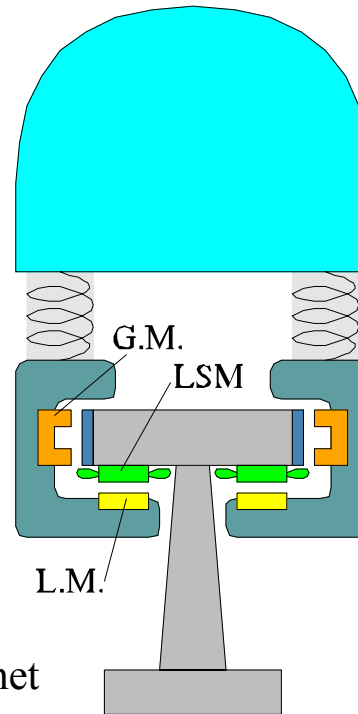
MAGLEVS in The World

Name	JR MLX 01	TRANSRAPID	HSST-100L
COUNTRY	JAPAN	GERMANY	JAPAN
			
Levitation	Electro Dynamic	Electro Magnetic	Electro Magnetic
	(Repulsive)	(Attractive)	(Attractive)
Propulsion	LSM	LSM	LIM
	(Long Stator)	(Long Stator)	(Short Stator)
			
Speed Range	500km/ h	500 km/h	100 km/h

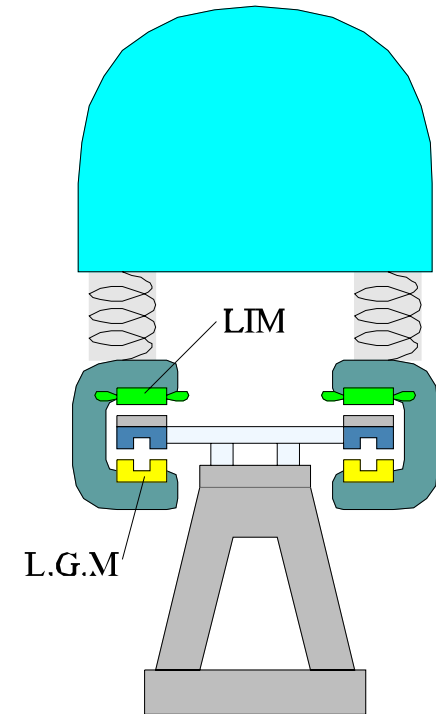
JR-Maglev



Transrapid



HSST



P.C.: Propulsion Coil G.M.: Guide Magnet
 L.C.: Levitation Coil L.M.: Lift Magnet
 SCM: Superconducting Magnet
 LSM: Linear Synchronous Motor
 LIM: Linear Induction Motor
 L.G.M.: Lift and Guide Magnet

1970s : Operational Experiments



2005 : Start Commercial Operation



1990s : Commercial Testing 100S and 100L

Development History

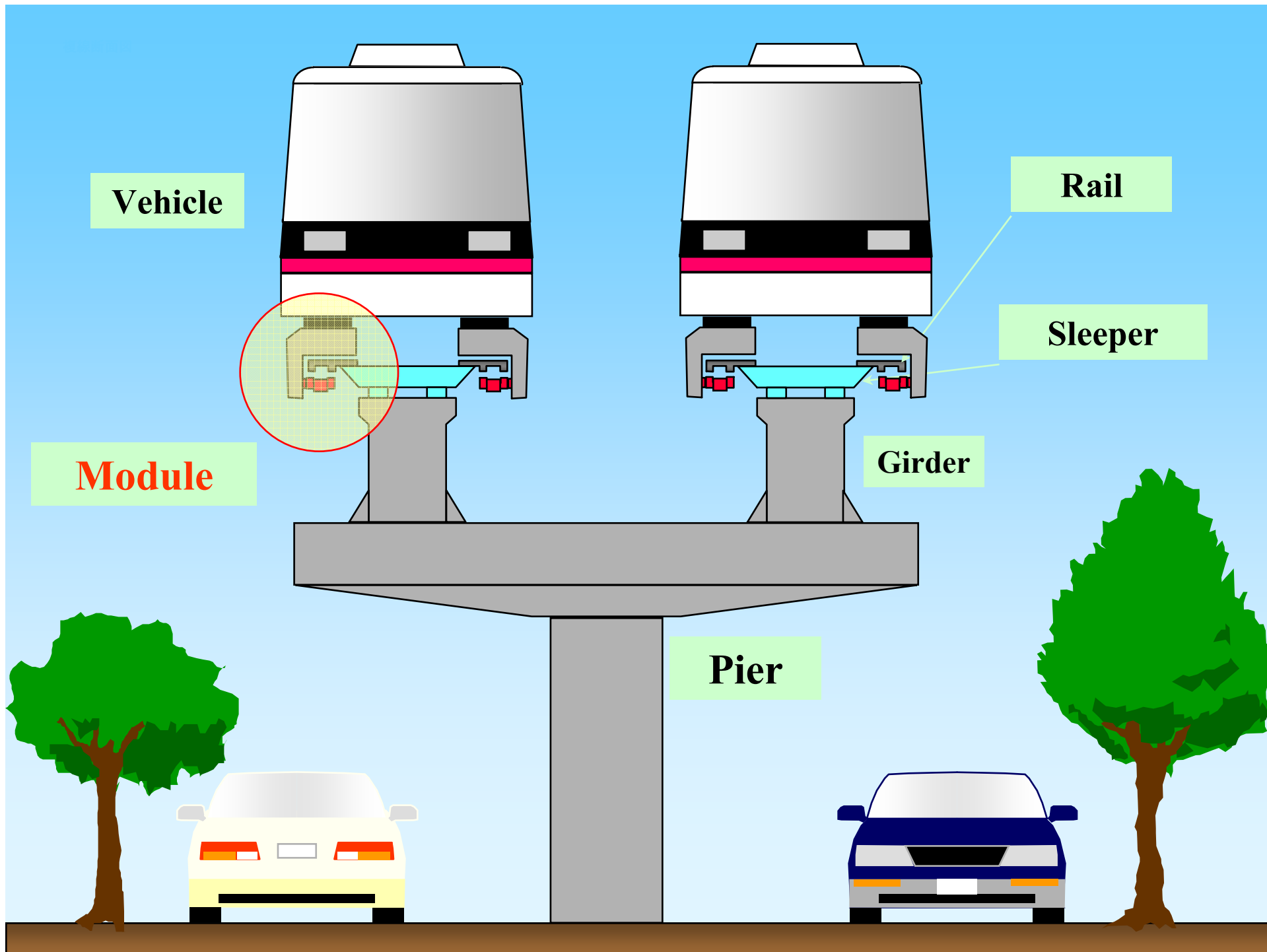


1991 to 1993 Evaluation Testing for Commercial Application

1993.4 Technical Evaluation by Ministry of Transportation on HSST-100 “No problem for commercial operation”



1999 Aichi Prefecture Government selected HSST for Tobu Kyuryo Line (The East Hillside Line)



Vehicle

Rail

Sleeper

Girder

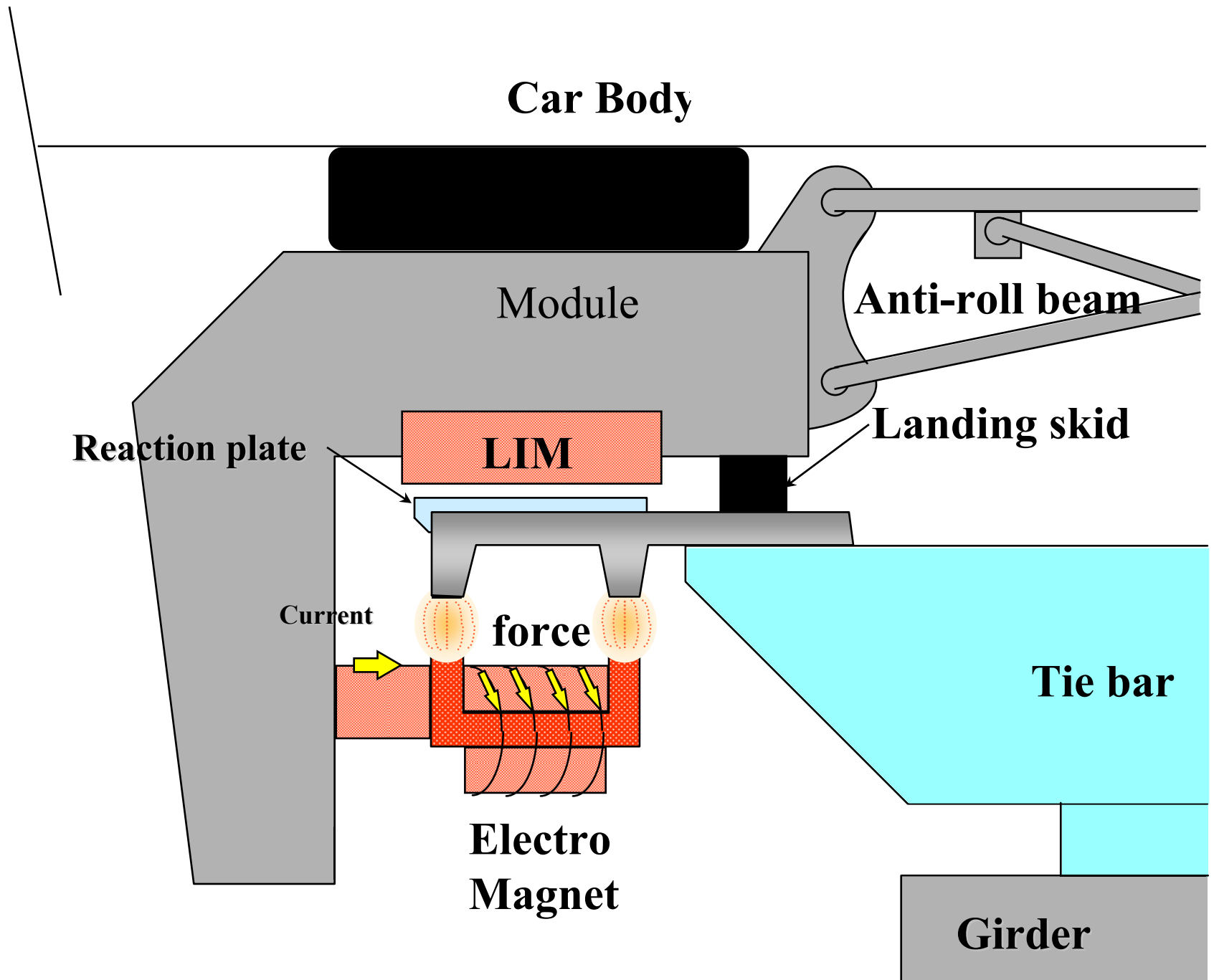
Module

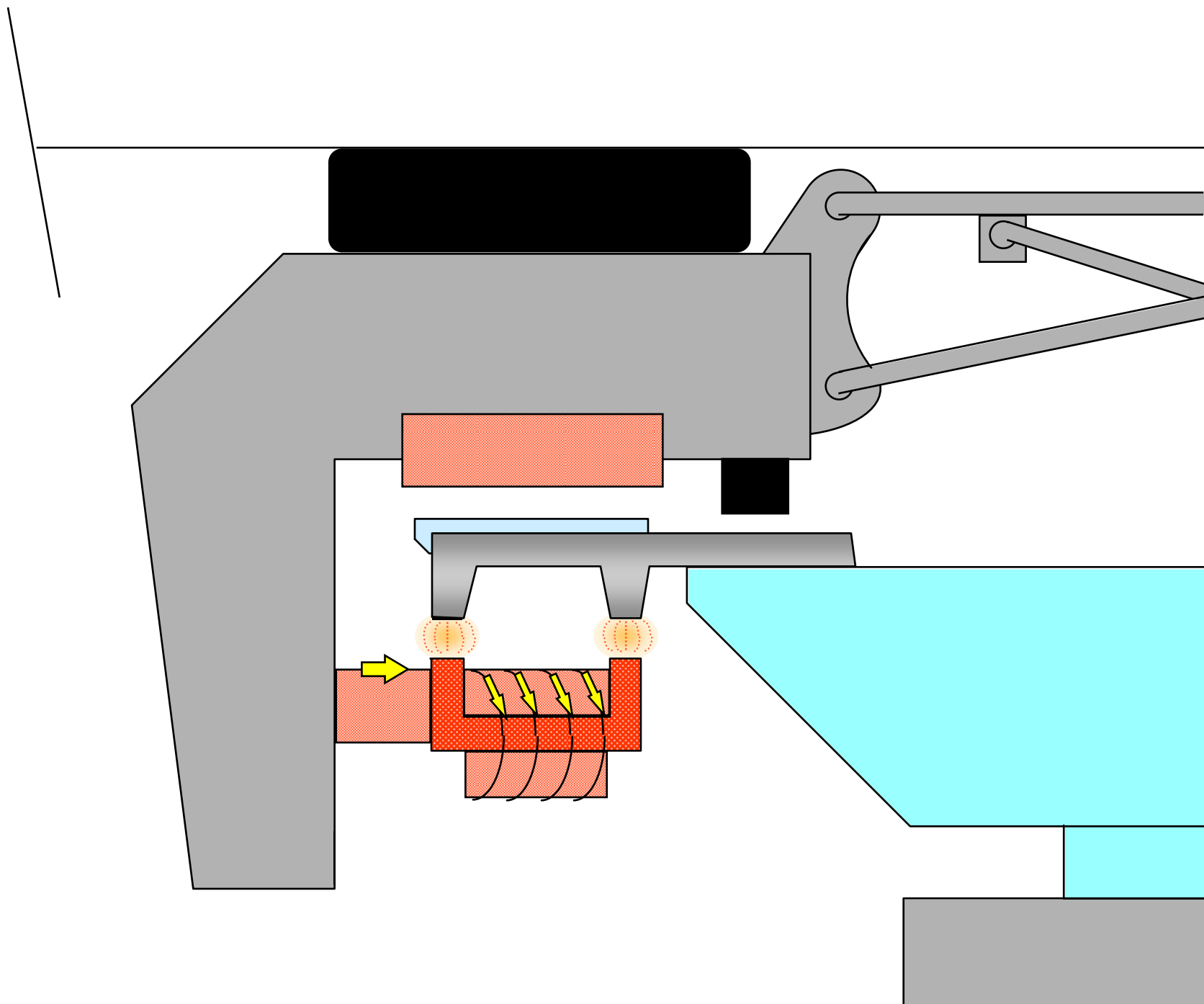
Pier

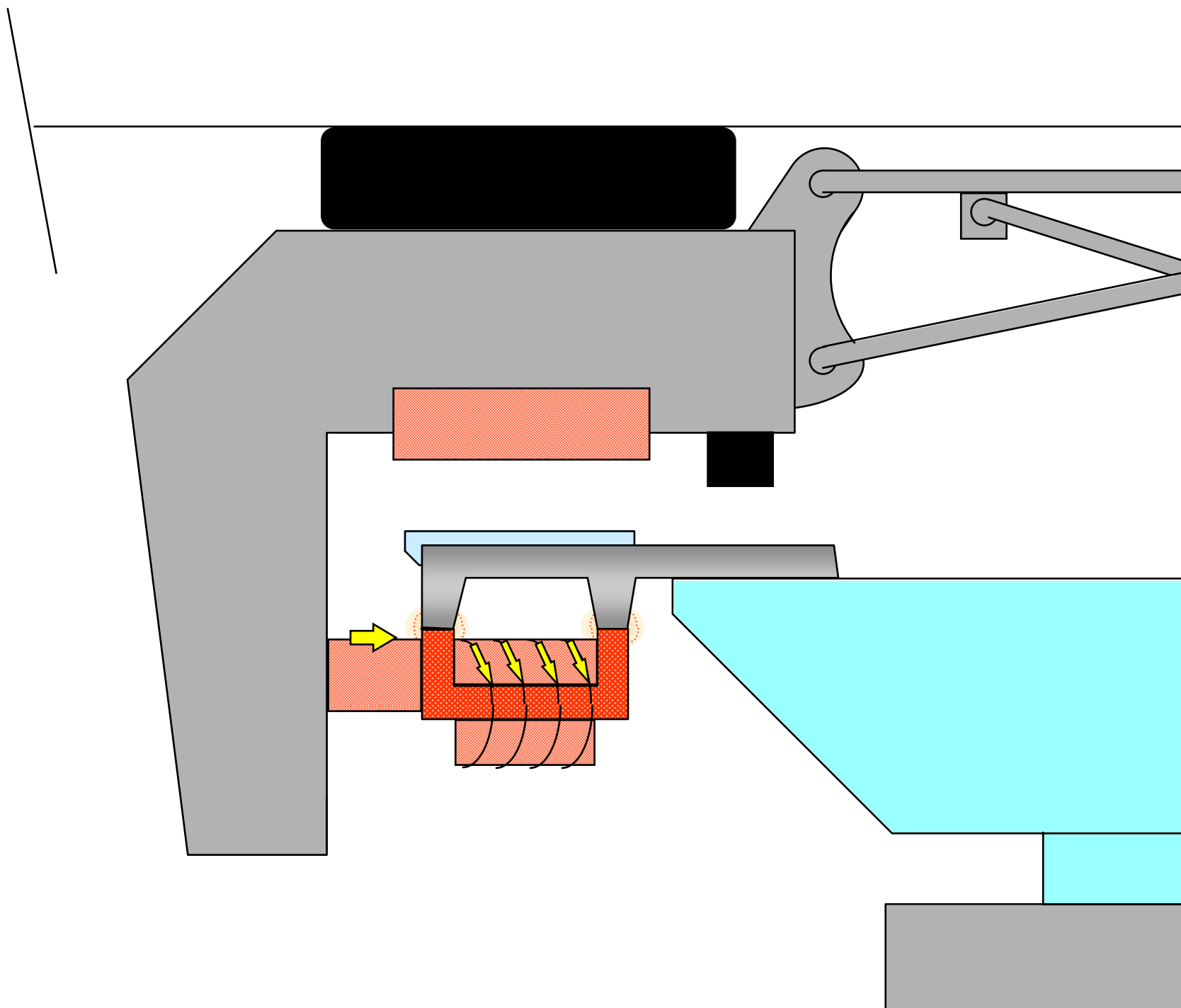
HSST

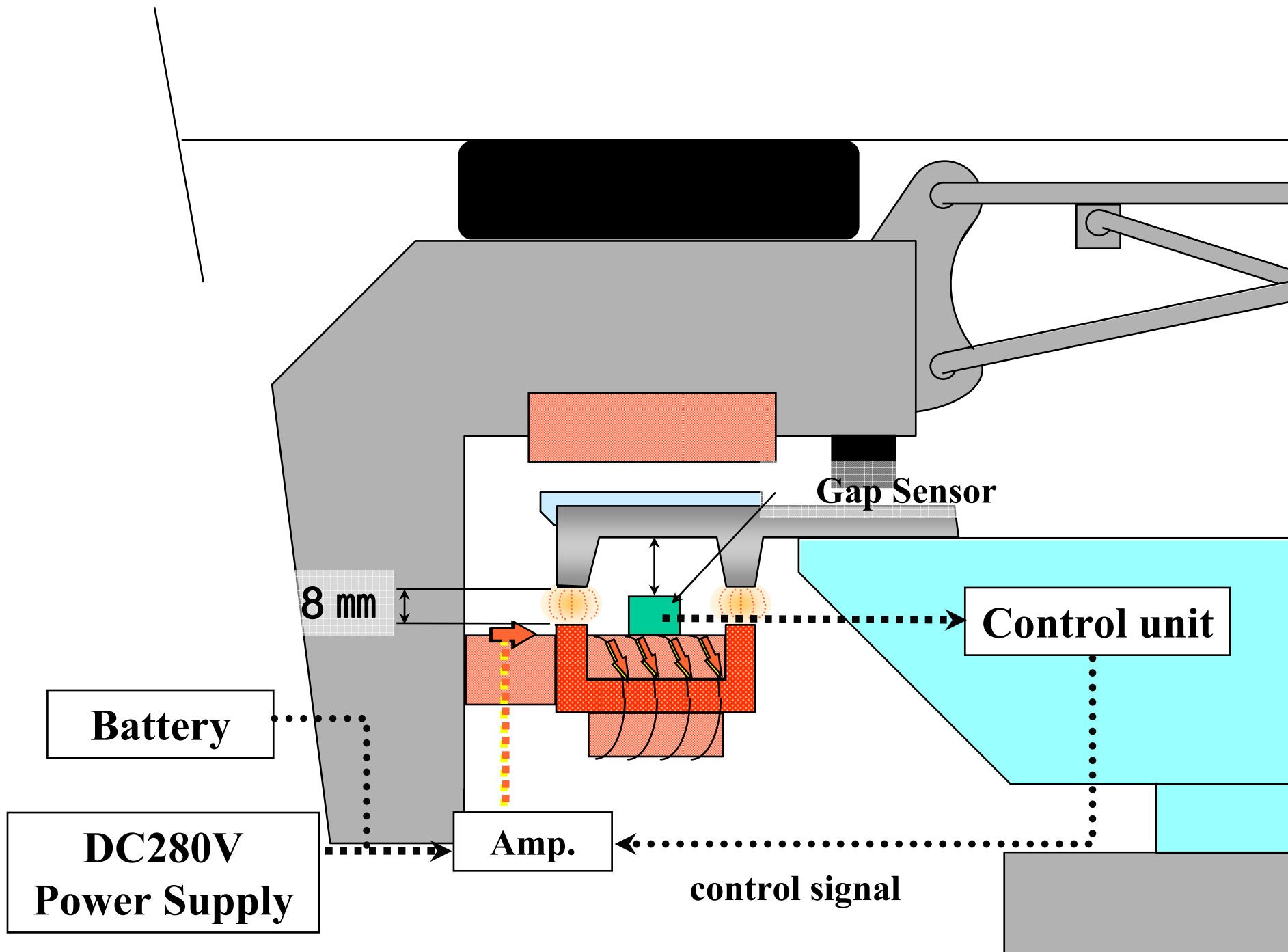
Concept of Levitation...

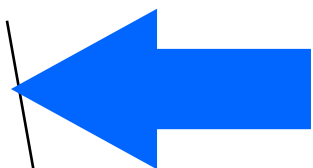


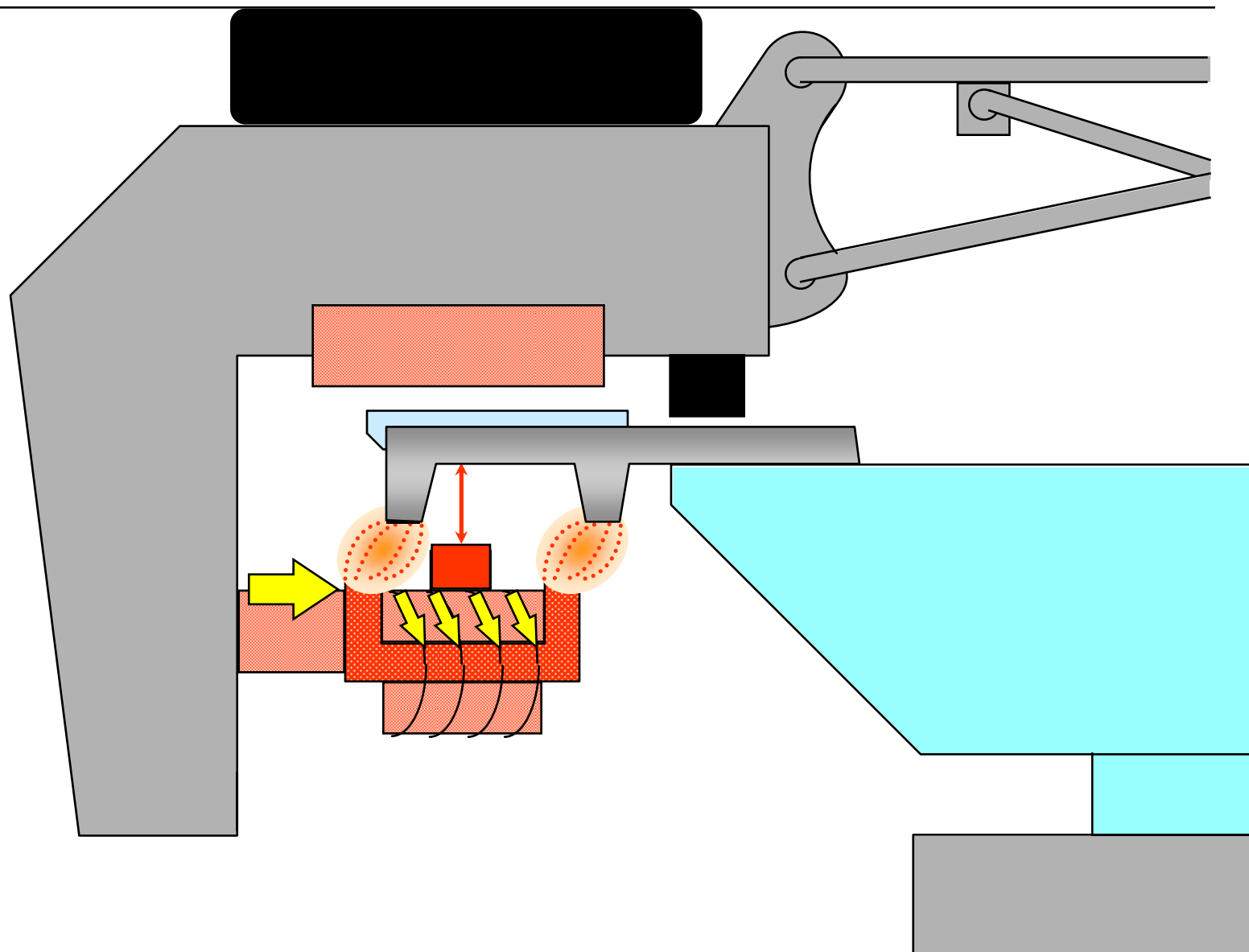


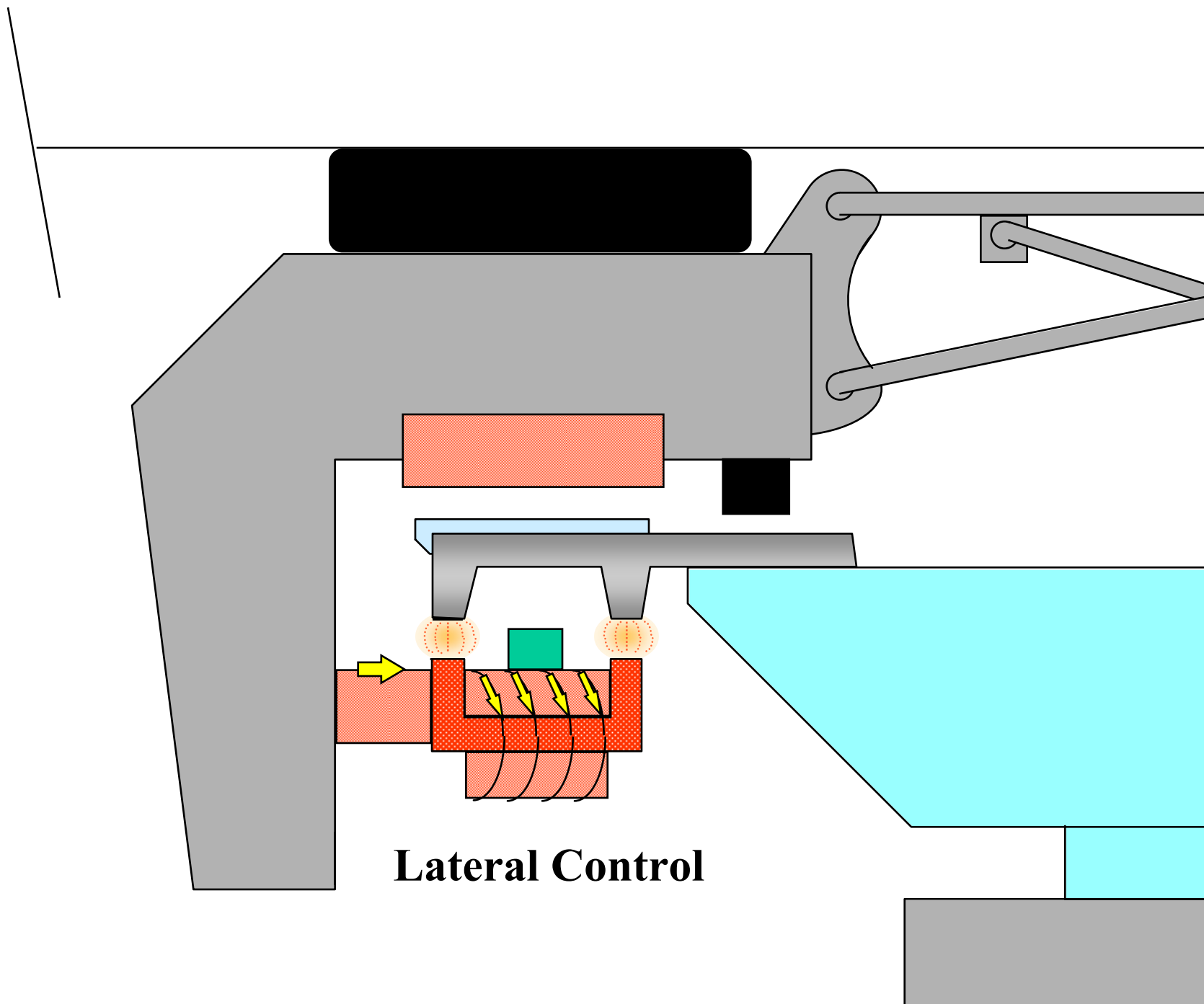






 **Lateral force**





A photograph of two high-speed trains on a track. The train on the left is white with a red stripe and the number 101. The train on the right is white with blue and green stripes. The text 'HSST' is overlaid in the center.

HSST

Concept of Propulsion...

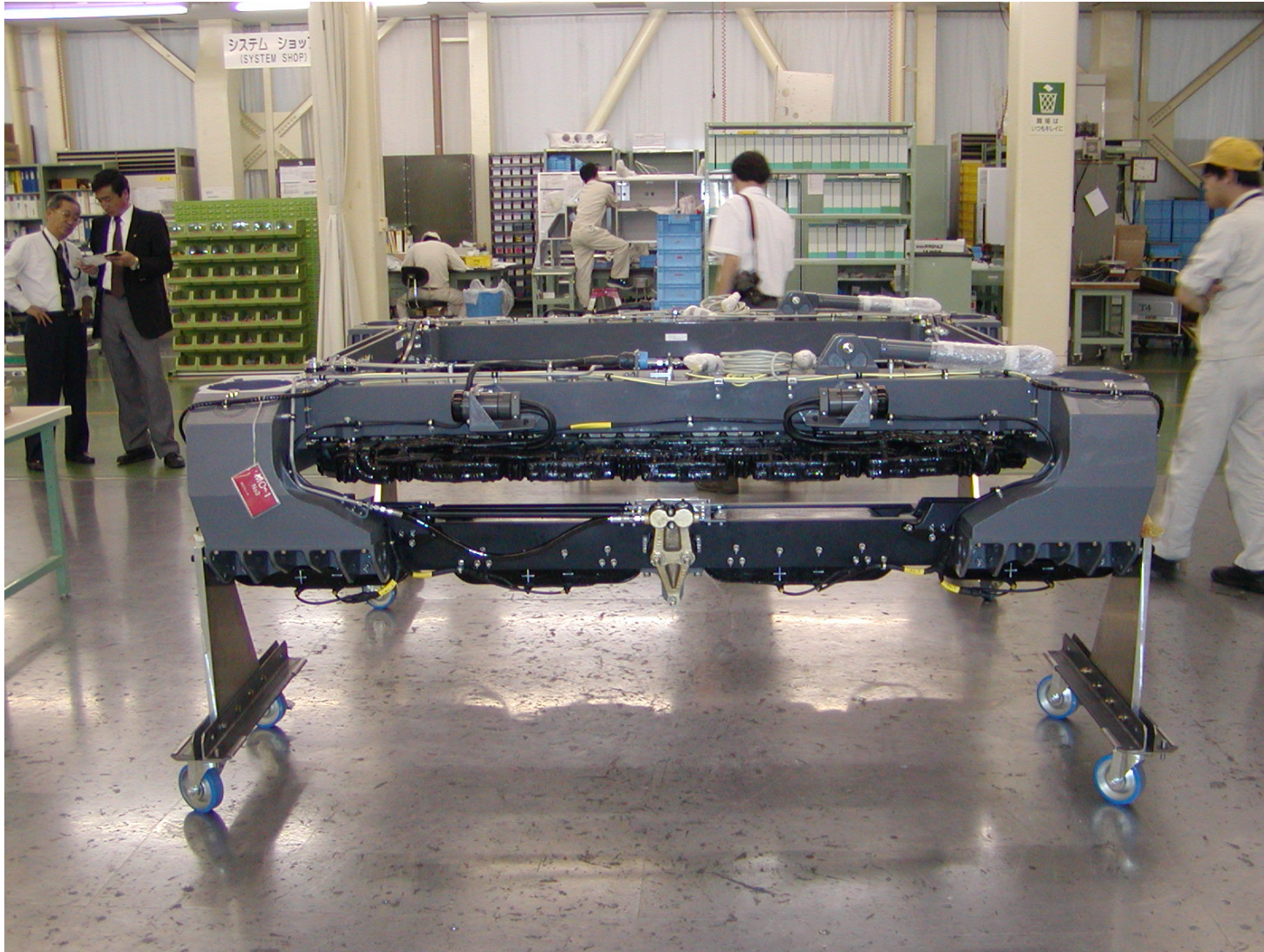
Module

Linear Induction Motor



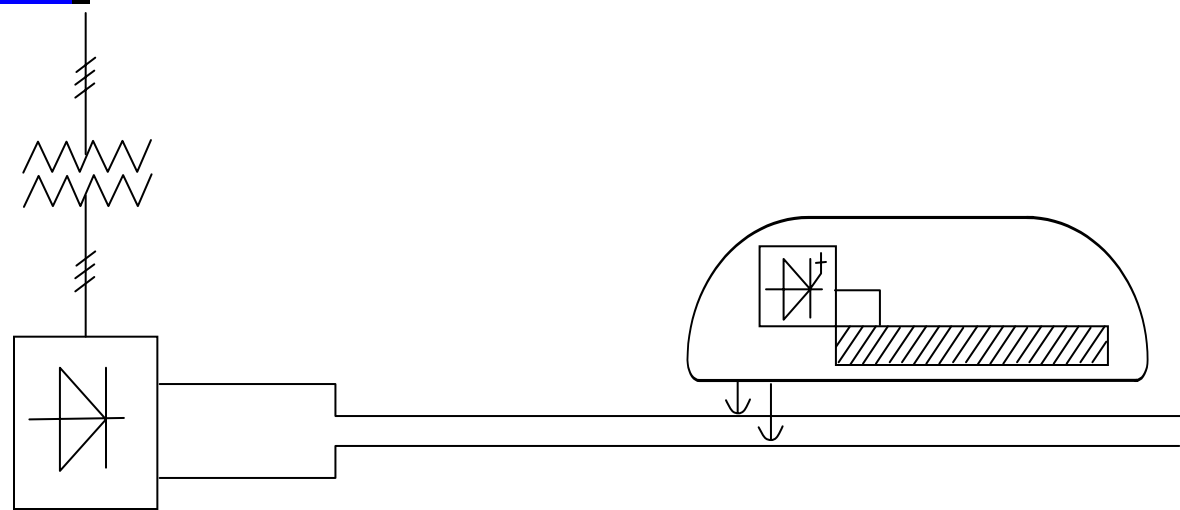
**Electro
Magnet**

Module (side view)

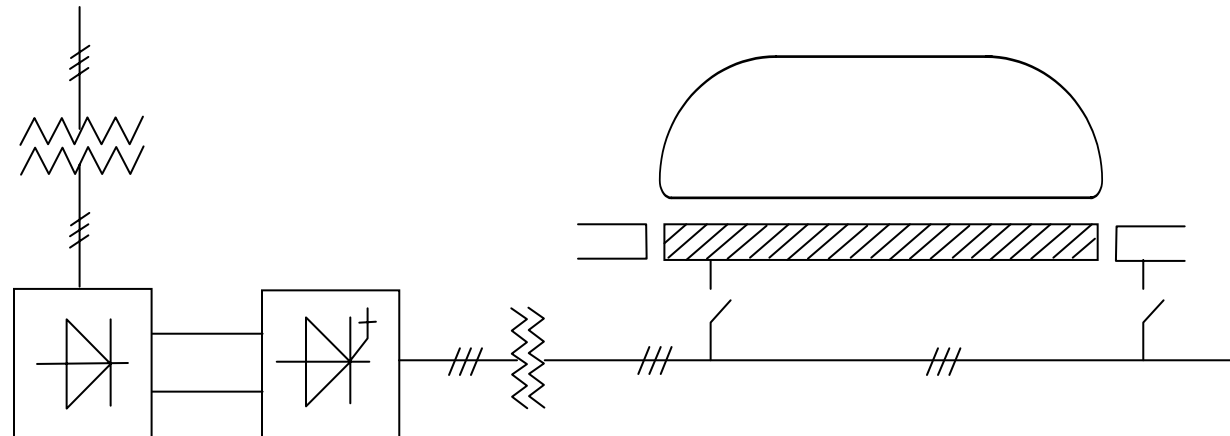


Propulsion System

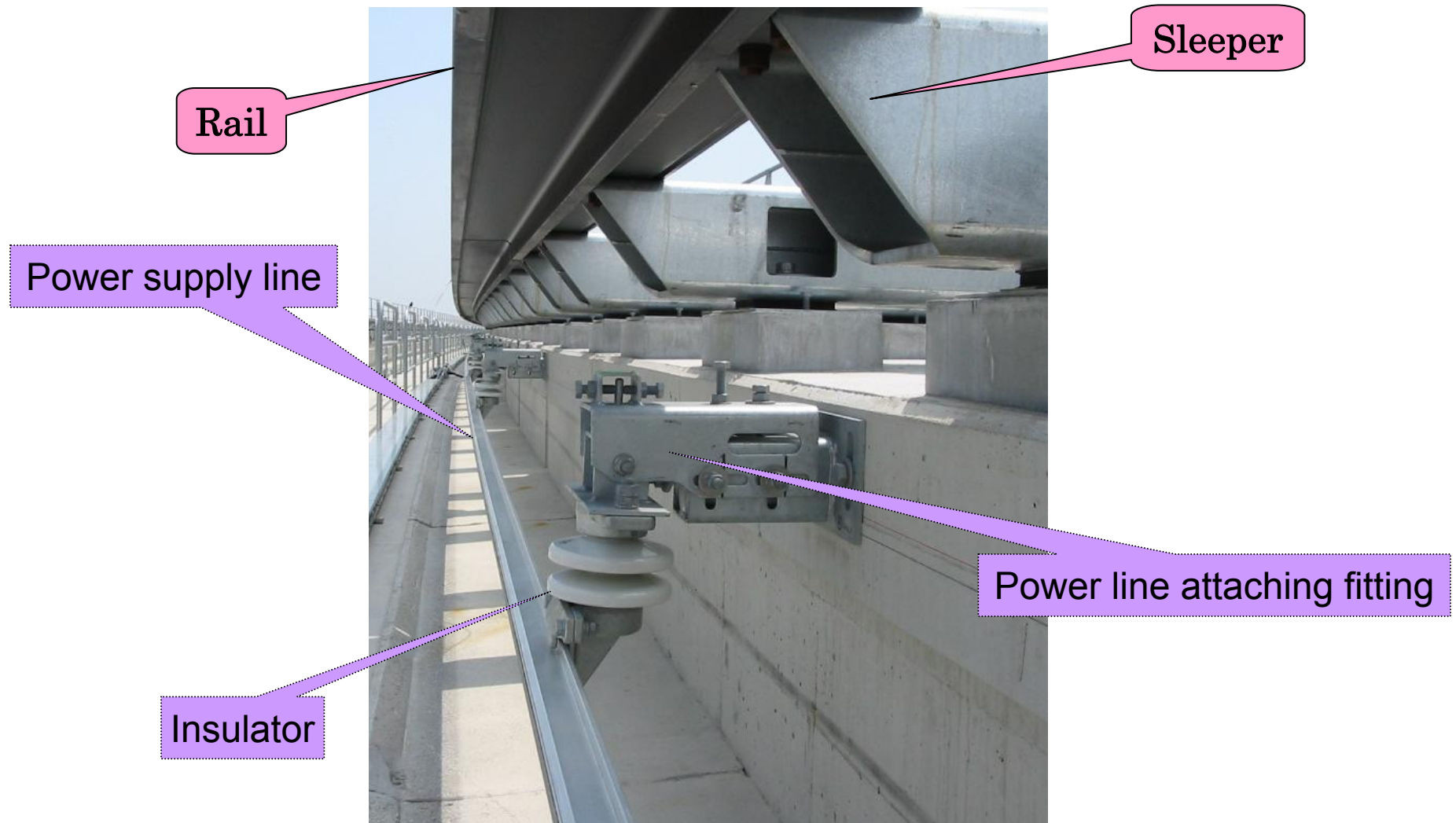
Short-stator Drive >> **HSST**



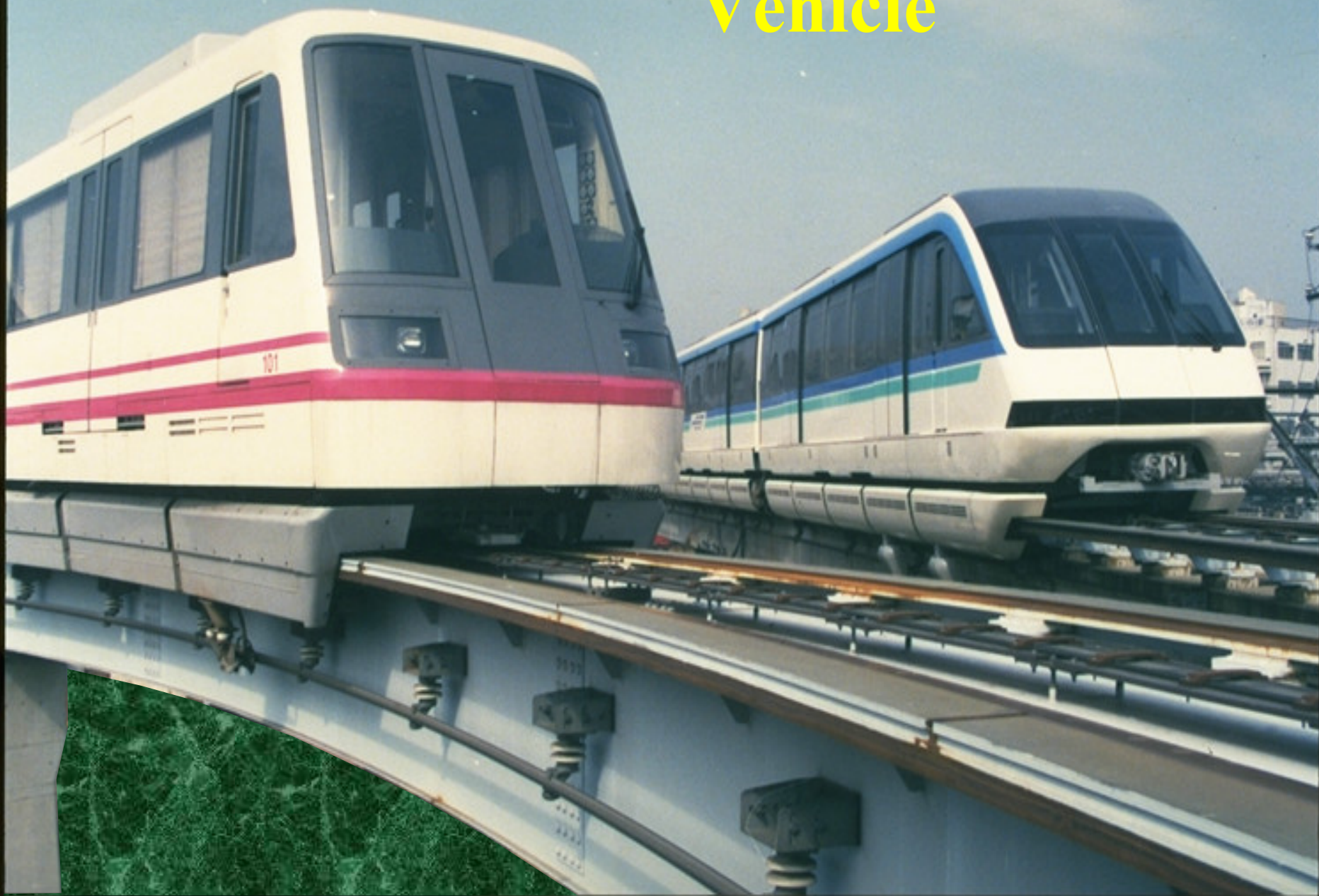
Long-stator Drive >> **JR-Maglev, Transrapid**



Power Supply Line

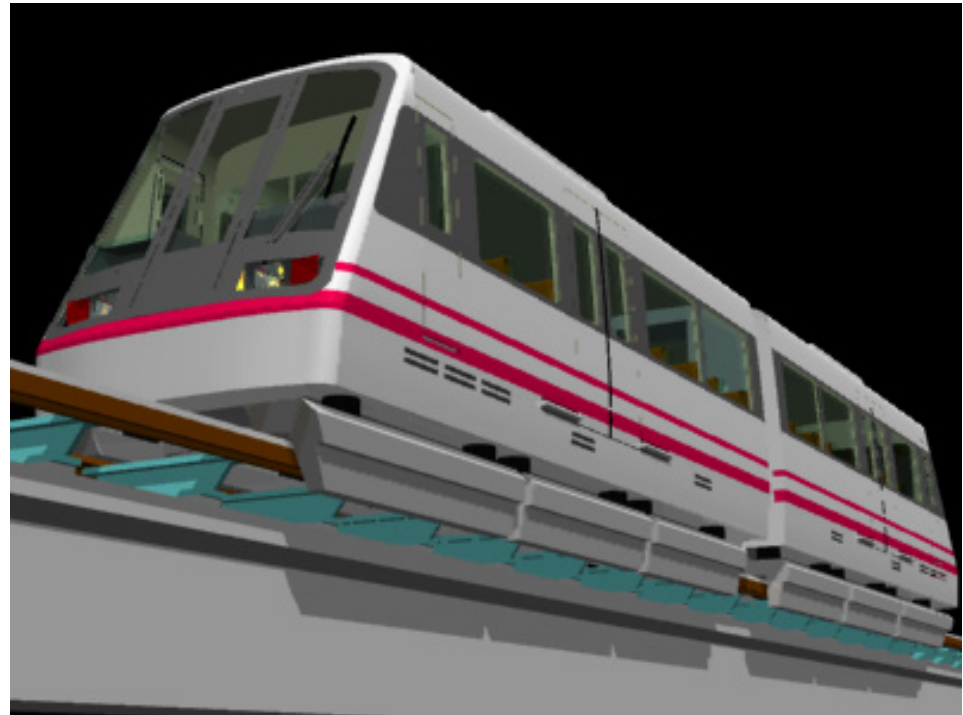


Vehicle



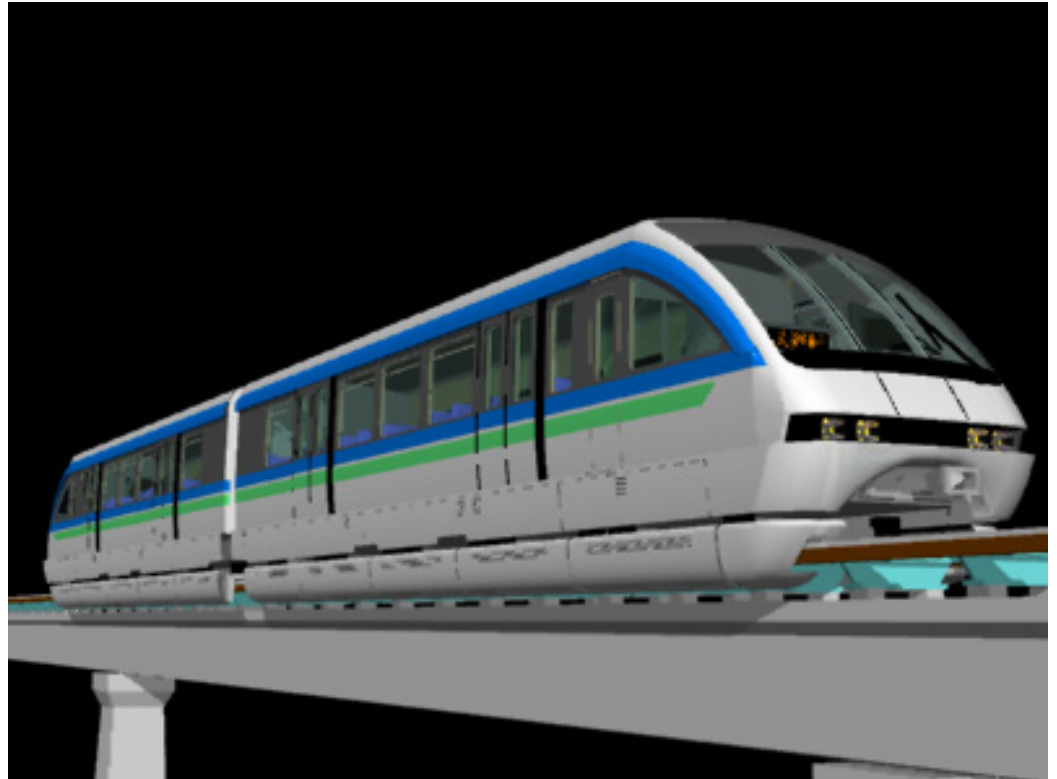
HSST-100S Vehicle

- **Size (L x W x H)**
8.5×2.6×3.4m
- **Weight (Empty-Full)**
11t/car – 15t/car
- **Passenger Capacity**
67 people/car
- **Max. Speed** 100km/h
- **Max. Gradient** 7%
- **Min. Curve Radius** 25m



HSST-100L Vehicle

- **Size (L x W x H)**
14.4 x 2.6 x 3.2m
- **Weight (Empty-Full)**
17t/car – 25t/car
- **Passenger Capacity**
110 people/car
- **Max. Speed** 100km/h
- **Max. Gradient** 7%
- **Min. Curve Radius** 50m

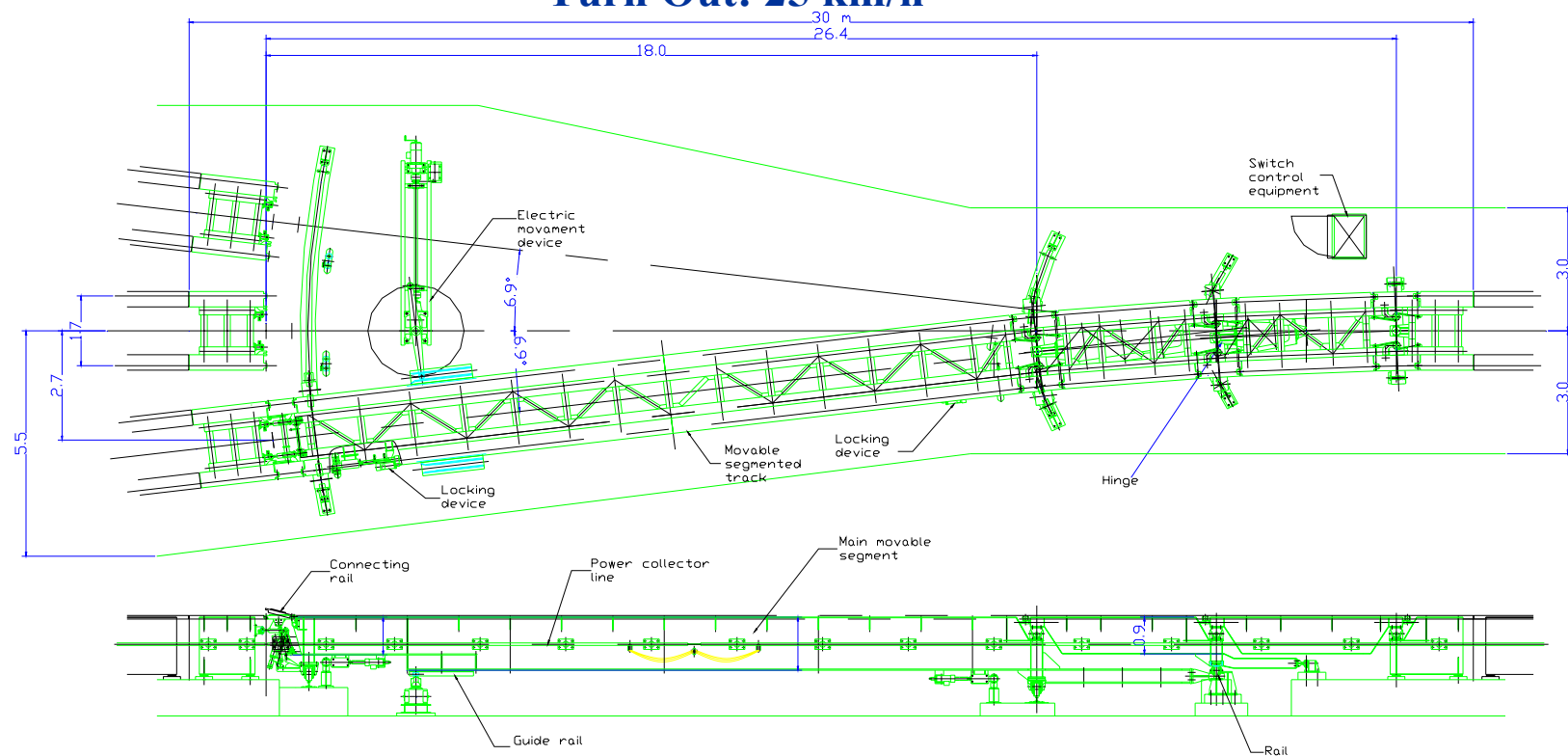


Segmented type 3-way Switch

Cyclic operational time : 17 sec

Vehicle Speed : Straight : No Limit

Turn Out: 25 km/h



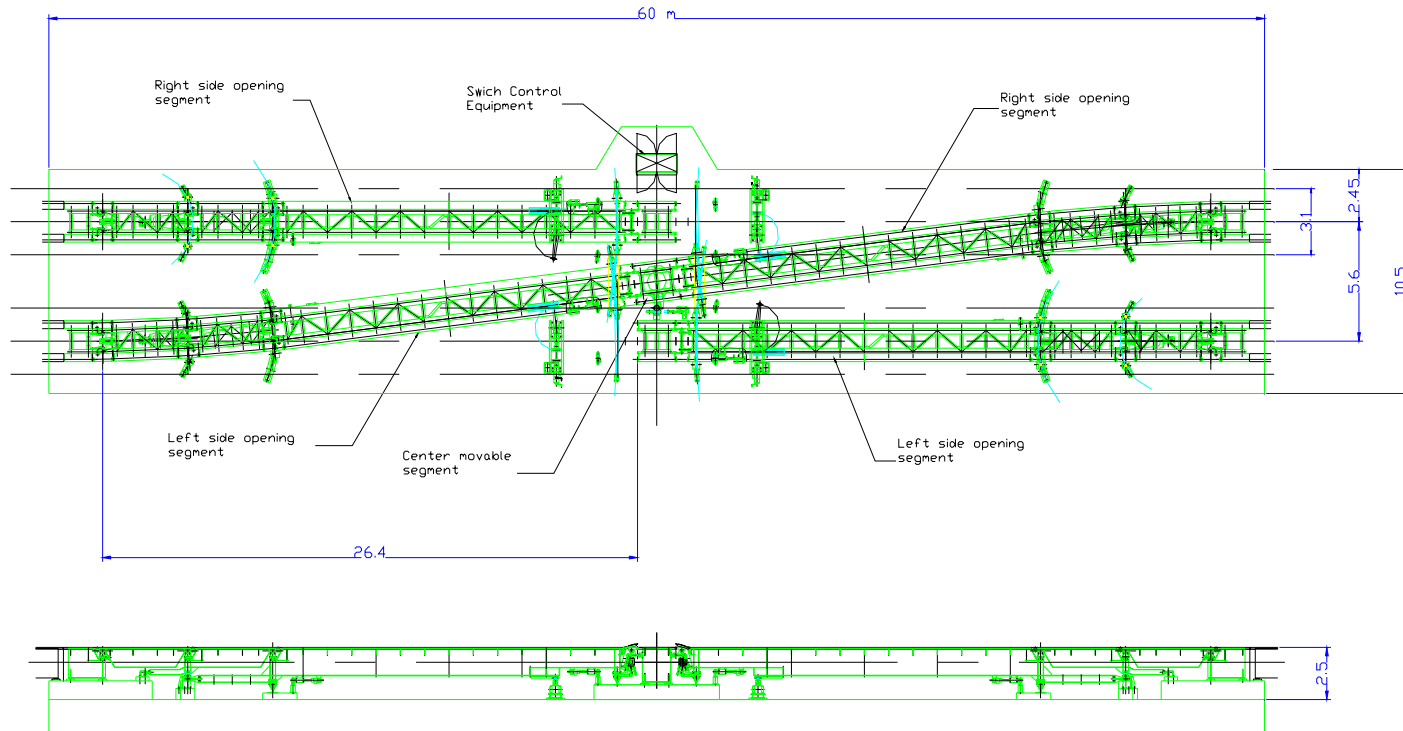
Three Segmented type Switch

Scissors type Switch

Switching time ; max.15 sec

Vehicle Speed : Straight : No Limit

Turn Out: 25 km/h



Crossover/scissors type switch

Advantages of HSST

- **Safe and Comfortable-----No Risk of Derailment**
- **Environmentally Friendly -----Noise and Vibration Free**
- **Steep Grade Capability ----- 7 %**
- **All Weather Operation ----- Run in Snow Fall**
- **Low Construction Cost -----Light Car and Uniform Load**
- **Low Maintenance Cost -----Maintenance Free Guideway
& Less Rotating Parts**



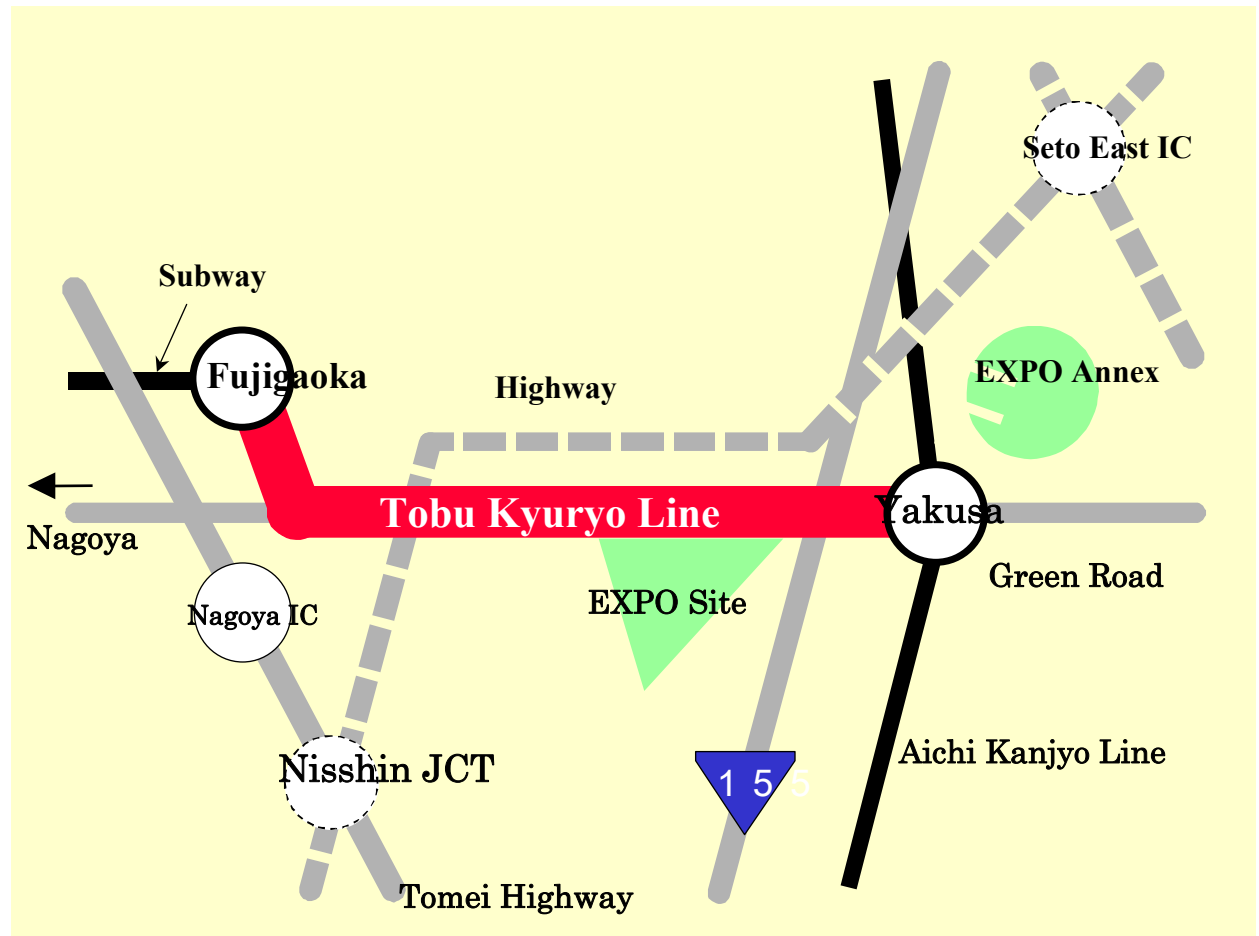
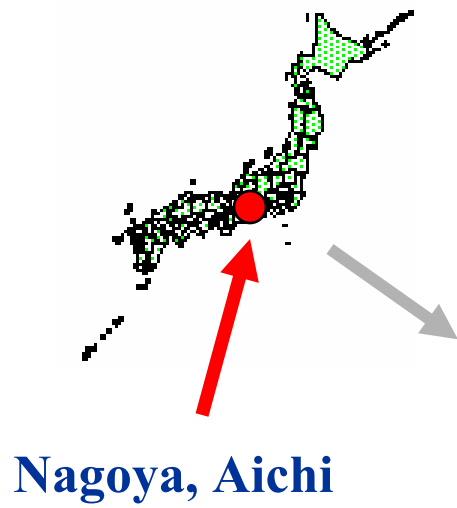
7 % Gradient



Run in Snowfall

Tobu Kyuryo Line

[Linimo] Linimo Route Location



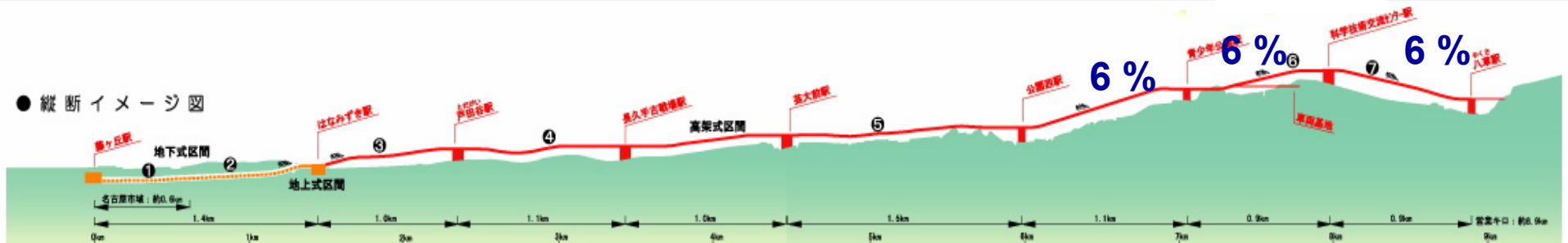
Linimo Route Outline

Fujigaoka

Yagusa

Depot

● 縦断イメージ図



Linimo Route Plan

Route Length:	8.9km (Double track) (From Fujigaoka to Yakusa)
Tunnel Section:	1.4km
Elevated Section:	7.5km
Number of Station:	9
Demand:	30,000 passengers/day
Peak Demand:	3,500 passenger/hour/way

Linimo System Outline

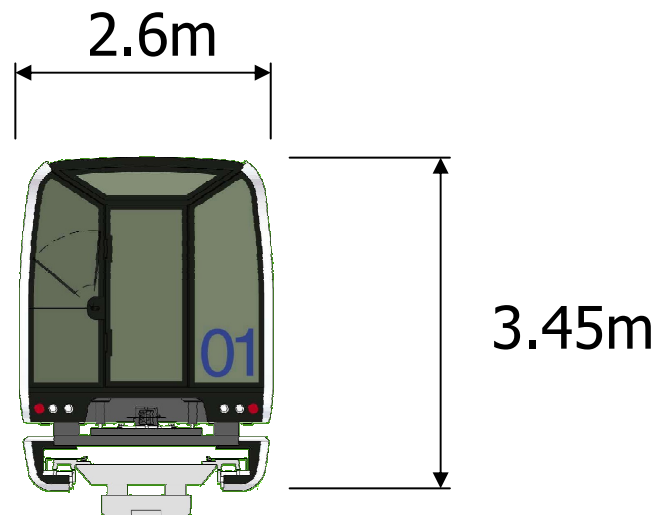
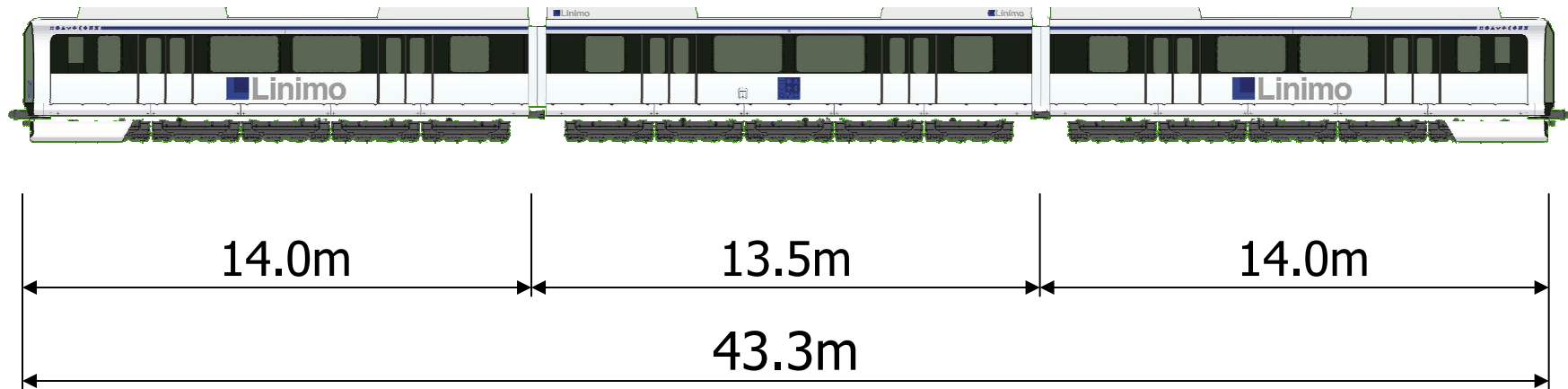
Trip Time (One way):	Approximately 15 min.
Maximum Operating Speed:	100 km/h
Number of Trains:	8+1 trains (3 car train)
Train Capacity:	402 persons/train (0.14 m²/person) 244 persons/train (0.3 m²/person)
Headway:	6 min. in peak time 10 min. in off peak time
Operation:	Driverless with ATO
Trolley rail voltage:	1,500 VDC

LINIMO Vehicle



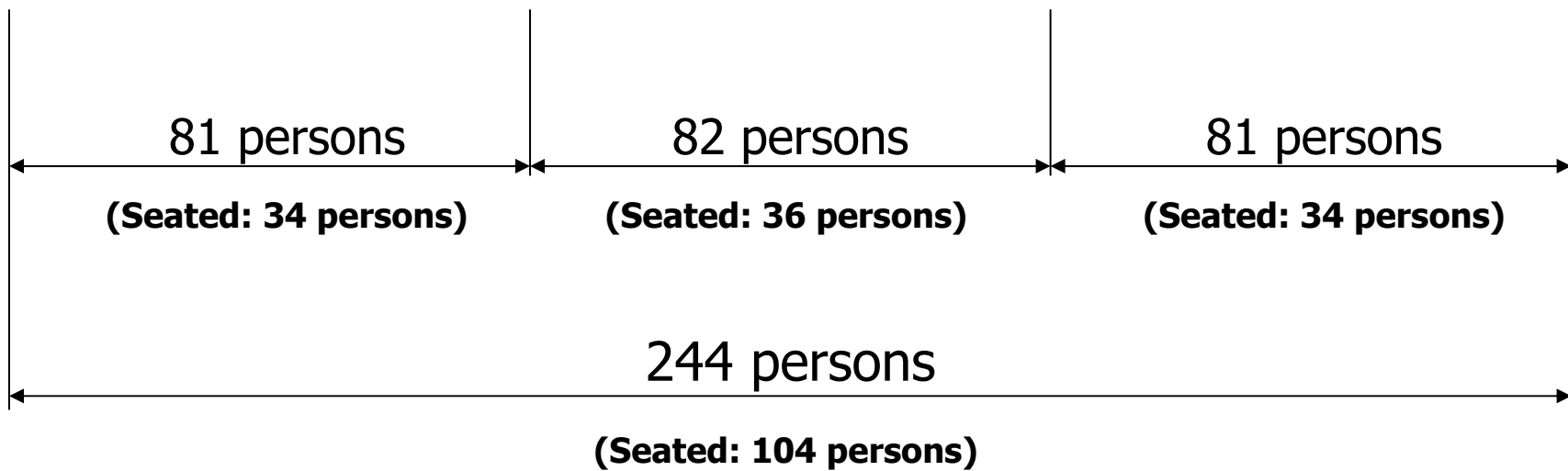
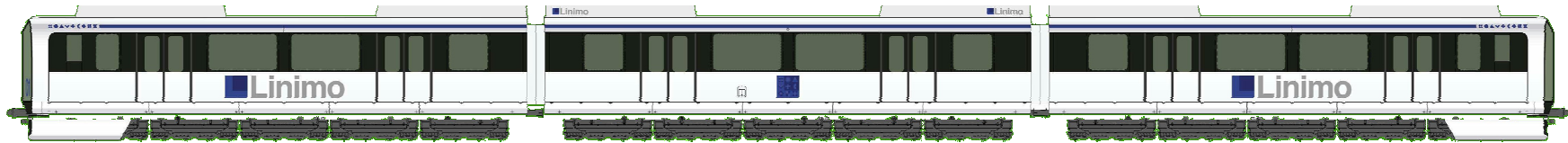
LINIMO Vehicle

Dimensions



LINIMO Vehicle

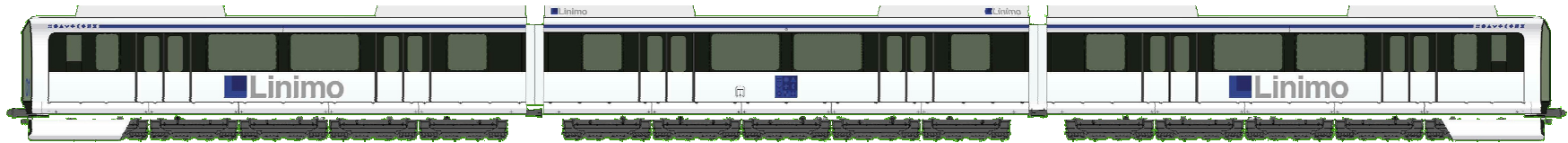
Passenger Capacity



	Mc	M	Train
No. of Seats	32+2	36	
100+4			
Standee (0.3m ² /person)	47	46	140
Standee (0.14m ² /person)	100	98	298
Capacity (0.3m ² /person)	81	82	244
Capacity (0.14m ² /person)	134	134	402

LINIMO Vehicle

Subsystem



- **Car Body Structure:** Aluminum alloy welded
- **Suspension:** “Module” system as primary
Air spring as secondary
- **Propulsion:** Linear Induction Motor (10 LIMs per car)
VVVF Inverter (IGBT)
- **Braking:** Electrical Brake as primary
Hydraulic Brake as back up
- **Operation:** ATO (Driver-less Automatic Train Operation)

LINIMO Vehicle



Interior



Control Console

Elevated Guideway



Hanamizuki-doori ~ Irigaike-koen



Irigaike-koen ~ Nagakute-kosenjo

Tunnel Section



Scissors Switch



Fujigaoka Station

Substation at Geidai-dori Station

For Nagakutekosenjo

For Kouen-nishi



Substation



77,000 V Receiving devices



 **Linimo**



 Linimo



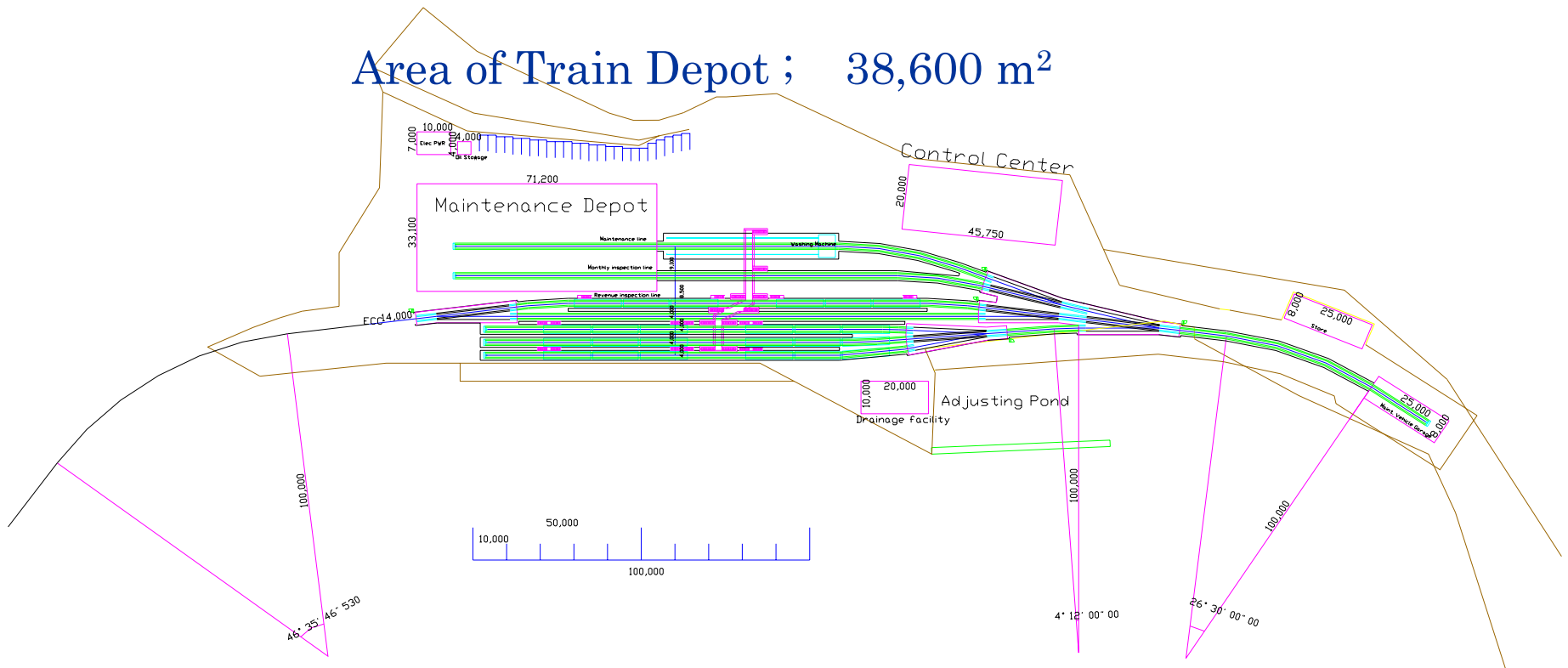
 Linimo



 Linimo

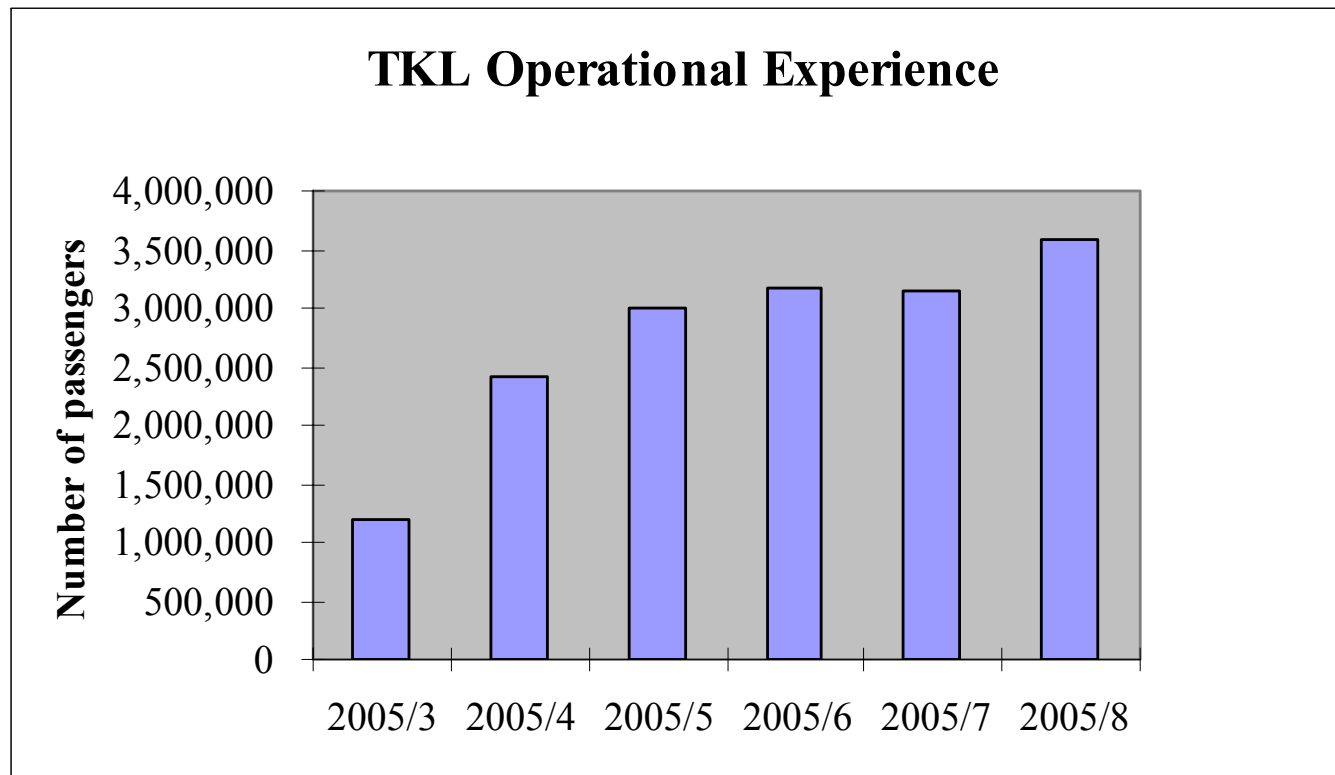
Linimo -- Train Depot

Area of Train Depot ; 38,600 m²



Plan View of Train Depot

Linimo Operational Experience



Total Passengers (2005/3/6 ~ 2005/8/31) : 16.5 million persons

Urban Maglev Programs in USA

- **Conducted by Federal Transit Administration**

- **Objectives:**

 - 1) **Evaluation of Proposed System Concept**

 - 2) **Prototype Subsystems Development**

 - 3) **System Integration and Development Planning**

- **HSST participation:**

 - Colorado Department of Transportation(CDOT)**

 - Maglev Urban System Associates (MUSA)**

An aerial illustration of a city landscape. In the foreground, a high-speed train (HSST) is traveling on an elevated track. To the right of the track is a multi-lane highway with several cars. The city is filled with green trees and residential buildings with orange roofs. In the background, a large body of water is visible, with a bridge and a city skyline. An airplane is flying in the sky above the city.

We believe
the HSST system will become one of
the core urban Transportation
systems in the world
as a reliable, environmental friendly
and economical transit system.

-END-



HSST carries dreams into the future

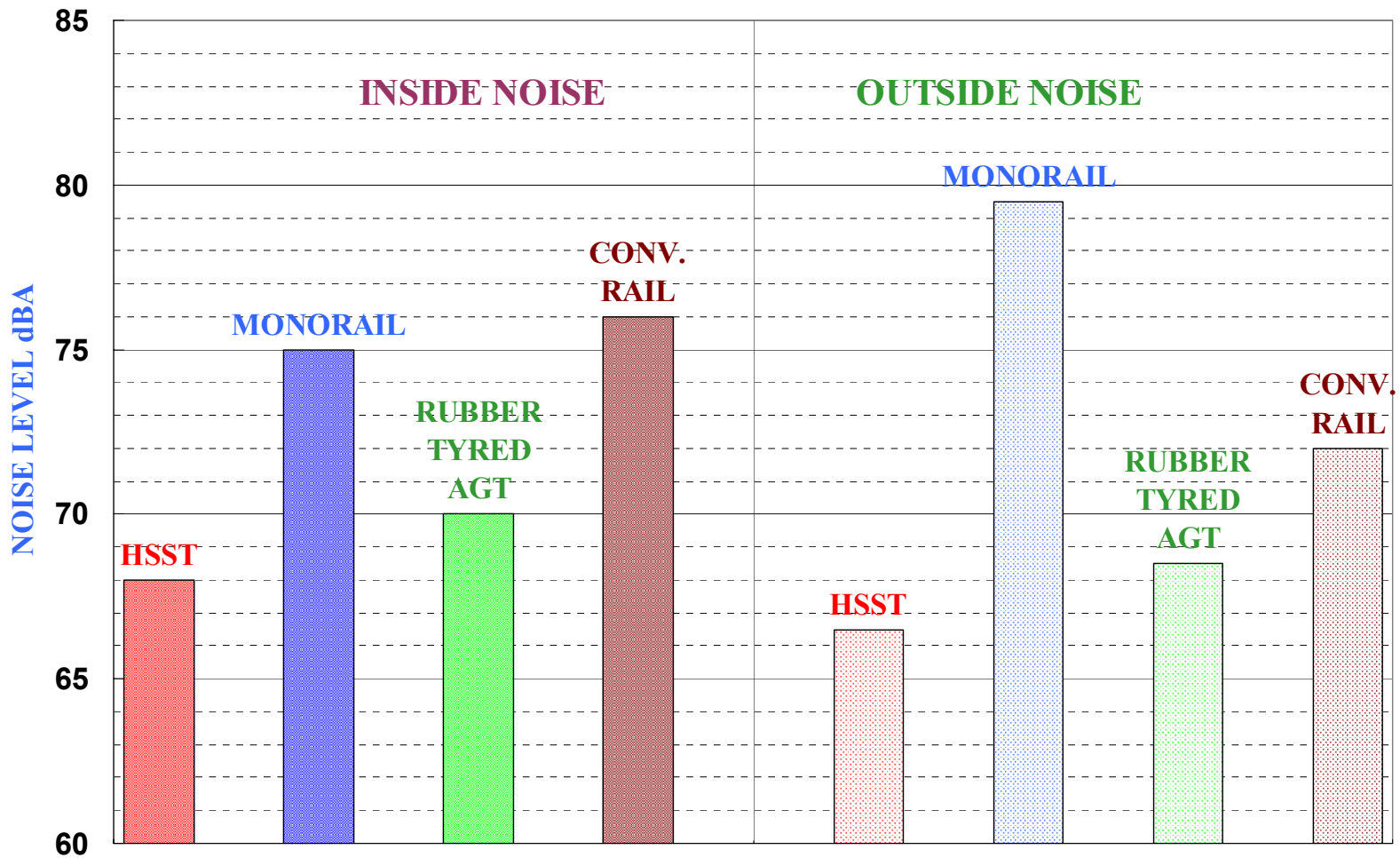
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Standard Specifications

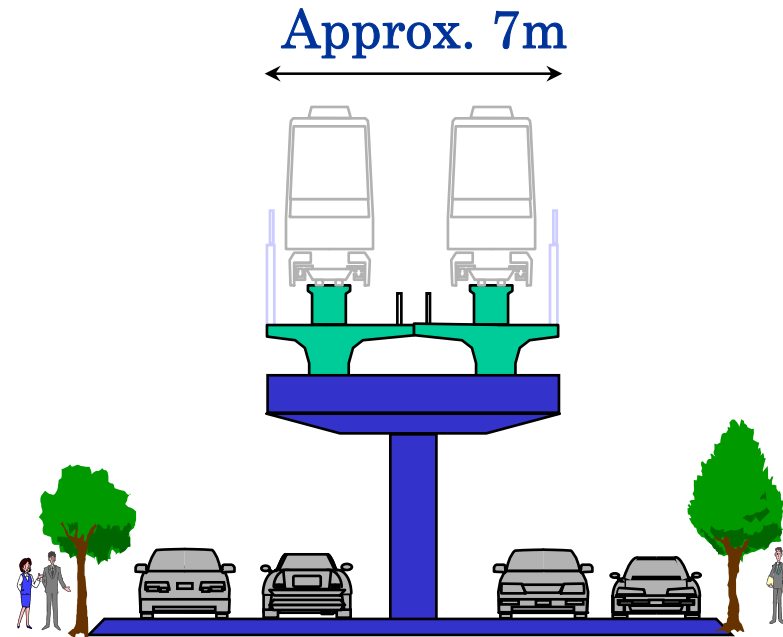
Type of HSST	HSST-100L	HSST-100S
Guideway		
Max. Gradient	7%	7%
Min. Horizontal Curve Radius	50m	25m
Min. Vertical Curve Radius	1500 m	700 m
Max. Superelevation	8 degree	8 degree
Vehicle Performance		
Max. Speed	100km/h	100km/h
Max. Initial Acceleration	4.0km/h/s	4.5km/h/s
Max. Deceleration/Service Brake	4.0km/h/s	4.5km/h/s
/Emergency Brake	4.5km/h/s	5.3km/h/s
Vehicle Dimensions		
Length (End Car)	14.4m	8.5m
Length (Mid Car)	13.5m	8.3m
Width	2.6m	2.6m
Height	3.4m	3.4m
Empty Weight/car	17,000kg	10,000kg
Max. Loaded Weight/car	28,000kg	15,000kg
Passenger Capacity		
Density of Standing Passenger:	0.3 m ² /person//0.14 m ² /person	
4cars train	302//488	194//290
6cars train	466//746	302//450

COMPARISON OF NOISE LEVEL



Note: Max. Noise Level [Lmax.s] measured at 10m from Guideway Center

Typical Guideway Cross Section



Typical Elevated Section

Tunnel Section

