



# The Disney Monorail System

A National Historic Mechanical Engineering Landmark  
The American Society of Mechanical Engineers  
December 1986



Disneyland  
Anaheim, California

# The Disney Monorail System

Since the time he first conceived the idea of Disneyland, Walt Disney was interested in the possibility of installing a practical monorail system there. During a visit to Europe in the Summer of 1957, Disney's engineering group examined the experimental monorail developed by the Alweg Corporation, near Cologne, Germany. After further investigation, the group reported to Disney that this design appeared to offer the best prospects for economy, stability, and all-around practicality, not only for Disneyland but for municipal transportation systems in general. The Alweg Company had been operating their test monorail in Germany since 1952. Its beamway was on a long curve approximately one mile in length, without grades. Disneyland and Alweg joined efforts in the summer of 1958 to develop the basic system into a working prototype for use at Disneyland.

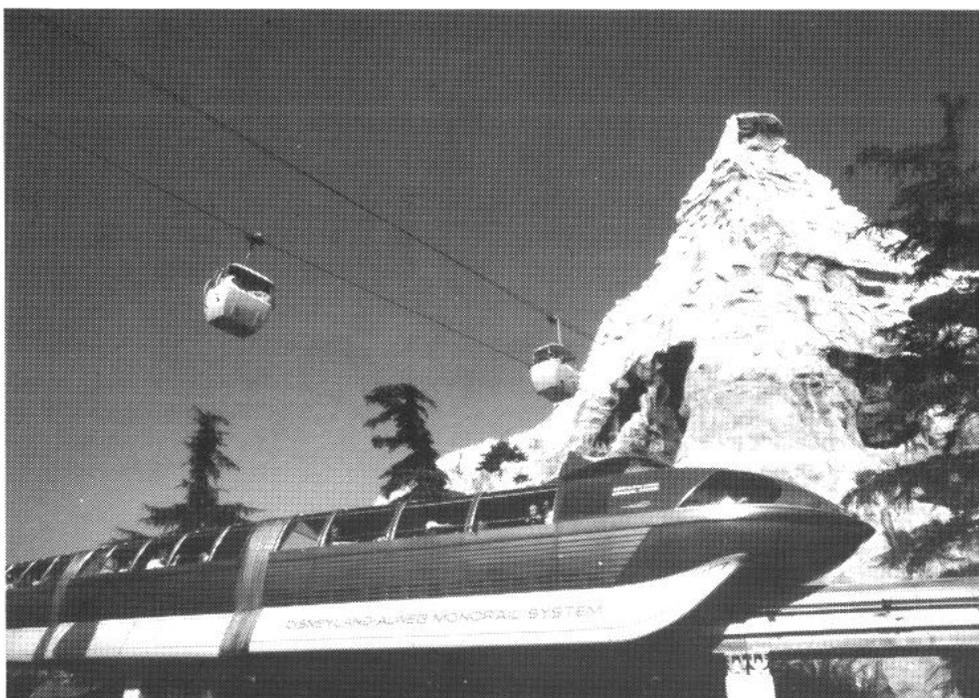
The monorail system at Disneyland has been purposely designed and developed to include curvatures of 120 feet radius, overpasses, and grades of 7%, in order to demonstrate the practicality of this system under different construction and topographic conditions. The beamways and pylons, as constructed for the Park, are on substantially the same scale that would be used for any metropolitan single-track system. The trains were designed by Walt Disney Imagineering (then known as WED Enterprises).

The design of the cars, including their motive power and braking and safety systems, could be utilized by any metropolitan transit system. For a city monorail, however, the cars would have to be larger to provide for standing room.

The original monorail system at Disneyland, which opened in 1959, included two trains, one blue and one red, and eight-tenths mile of track. A gold train and additional cars for the red and blue trains were added in the first few years of operation to expand capacity.

In June, 1961, the monorail was extended to the Disneyland Hotel. This made it the first monorail in America to run adjacent to a major highway (Harbor Boulevard) and to cross a city street (West Street). The total length of the system now is 12,300 feet—nearly 2½ miles.

In 1969 Walt Disney Imagineering designed and manufactured a new fleet of four five-car trains to replace the original trains, at a cost of more than two million dollars. This was almost twice the original investment for the entire 1959 monorail system including beamways. These new vehicles had greater capacity, operated more efficiently, and had fewer maintenance requirements.



A 1969 MARKIII Monorail train passes the Disneyland Matterhorn.



The 1987 MARKV monorail on an early test run.

Each train has ten pneumatic tires that ride over the elevated beamway and carry the weight of the vehicles. In addition, there are 44 smaller pneumatic tires that run along the sides of the "I"-shaped beam to guide and stabilize the train. Both dynamic braking and air braking are employed on the drive wheels.

The monorail trains are electrically powered, operating on 600-volt direct current transmitted along a pair of copper and steel buss bars mounted on the right side of the beam. Each train is powered by four 100-horsepower traction motors and can reach speeds in excess of 50 miles per hour. For use at Disneyland, the monorail system has been designed and developed for a top running speed of 35 miles per hour.

The concrete beamway is composed of precast I-section girders. They were cast in steel forms that can be adjusted to produce either straight or curved sections.

In 1987, a new fleet of monorail trains, dubbed the MARK V, will debut. The first three generations of Disneyland monorails were named, respectively, MARK I through MARK III; the Walt Disney World Monorail system is the MARK IV.

The new Disneyland trains will feature an upgraded version of the existing chassis and new, all-fiberglass bodies, giving lighter and more energy-efficient units than the present metal-bodied versions. An onboard computer system will keep daily maintenance records and operate control functions.

The new monorail trains were designed by Walt Disney Imagineering and manufactured by Messerschmitt, Bolkow and Blohm in West Germany.

---

Walt Disney explains the design plans for Disneyland's inaugural monorail fleet.



**NATIONAL HISTORIC  
MECHANICAL ENGINEERING LANDMARK**

Disneyland Monorail System  
1959

Disney engineers designed this monorail system, based on the system developed by Axel L. Wenner-Grenn (Alweg). Built at the Walt Disney Studios, the system is intended to apply to urban transit. Opened in 1959, it has been in daily passenger service ever since. The cars are equipped with 600 Volt D.C. 100 HP electric motors driving rubber tired wheels on a single beam trackway.

**THE AMERICAN SOCIETY OF  
MECHANICAL ENGINEERS**

December 1986

## DISNEY MONORAIL SYSTEM

### **CAPACITY:**

Five-car trains accommodate 132 guests each. Four trains comprise the system.

### **SPEED:**

The running speed varies from 10 mph to 35 mph depending on the curvature of the beamway and proximity to the stations.

### **BEAMWAY:**

The Disneyland Monorail beamway extends 12,300 feet—nearly 2.5 miles—between Tomorrowland and the Disneyland Hotel.

### **OPERATION AND COMMUNICATION:**

Each train is operated by a pilot seated in the forward car. The pilot is the captain in charge of the train. All mechanical and electrical controls are operated from this compartment. The pilot can communicate to the passengers through speakers located in each car. He is also in constant communication with other trains and stations by short-wave radio. Safety controls automatically regulate the speed of trains at all times. Train doors are opened automatically by the pilot when the trains are standing in the stations.

### **RUNNING GEAR:**

The train's undercarriage straddles the beamway with rubber-tired drive and braking wheels on top of the beamway; guiding and stabilizing wheels are in contact with both of its sides of the beamway. Each train has ten vertical or load-carrying wheels, 40 stabilizing or horizontal wheels, and four guiding wheels.

### **POWER:**

Each train is powered by four 100-horsepower, 600-volt direct-current motors.

### **GENERAL MONORAIL BACKGROUND:**

The principle of mass transportation via elevated vehicles suspended from or carried on a single beam is not new. Discussions concerning the practicability of a monorail took place before the invention of the automobile or the airplane. In fact, as early as 1878, a steam-powered monorail system operated successfully between Bradford and Gilmore. In 1892 an electric car, running along a single rail, operated on Long Island. The world's longest-operating monorail, Germany's Schwebbahn at Wuppertal, has been in operation since 1901. The predecessor of the Disneyland Monorail, designed by Alweg Corporation, opened in Cologne, Germany in 1952. Unlike the Schwebbahn system, the trains of which are suspended from an overhead rail, the Cologne and Disneyland monorails straddle a beam and are supported and stabilized by vertical and horizontal wheels.

## ABOUT THE LANDMARKS...

The Disneyland Monorail System is the eightyfourth National Historic Mechanical Engineering Landmark to be designated since the program began in 1973. Since then, twenty International and nine Regional Landmarks have been recognized by the Society. Each represents a progressive step in the evolution of mechanical engineering and each reflects its influence on society.

The landmarks program illuminates our technological heritage and serves to encourage the preservation of the physical remains of historically important works. It provides an annotated roster for engineers, students, educators, historians and travelers and helps establish persistent reminders of where we have been, where we are, and where we are going along the divergent paths of discovery.

The Orange County Section gratefully acknowledges the efforts of all who participated in the landmark designation of the Disneyland Monorail System, particularly Ken Kohler of Disneyland and the staff of Walt Disney Imagineering.

### THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Nancy D. Fitzroy, PE President  
E. Nick Friesen, PE Vice President, Region IX  
George I. Skoda, PE Region IX History & Heritage  
Paul F. Allmendinger, Executive Director

### THE ASME NATIONAL HISTORY & HERITAGE COMMITTEE

Dr. R. Carson Dalzell, Chairman  
Curator Robert M. Vogel, Smithsonian Institute  
Dr. Robert B. Gaither  
Dr. Richard S. Hartenberg, PE  
Dr. J. Paul Hartman, PE  
Joseph P. Van Overveen, PE  
Prof. Euan F. C. Somerscales

### THE ASME ORANGE COUNTY SECTION

Robert J. Cammack, PE, Chairman  
Gordon R. Short, PE, Vice Chairman  
Bruce Harvey, Secretary  
Caecilia Gotama, Treasurer  
Frank Landon, PE, History & Heritage