

Definition and Description of Monorail

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Monorail for transportation of people and light freight is characterized by the combination of the two words, "mono" (one) and "rail", meaning **a transportation system that is supported and stabilized along a single rail**, which commonly is called a **beamway** for an elevated system.

A monorail beamway is usually not more than half the width of the vehicle, which means a monorail vehicle, for safety reasons, therefore has to be internally **stabilized to prevent lateral overturning** of the vehicle. Because of the narrow beamway, the **economics and environmental impact by monorail guideways systems are much less** when compared to light or heavy rail, which applies a wider, more expensive guideway that has limited flexibility.

Monorails can be classified under 3 basic types:

1. **Monorails that are *suspended under a beamway*** are all elevated types, and because of necessary traffic clearance under the vehicle, has the largest aerial requirement in monorail comparisons. The beamway is above the vehicle and propulsion motors and bogies are on top of the vehicles.

An example is the Wuppertal Monorail in Germany. This is perhaps the oldest of all monorails and is still in operation (Illustration 1)



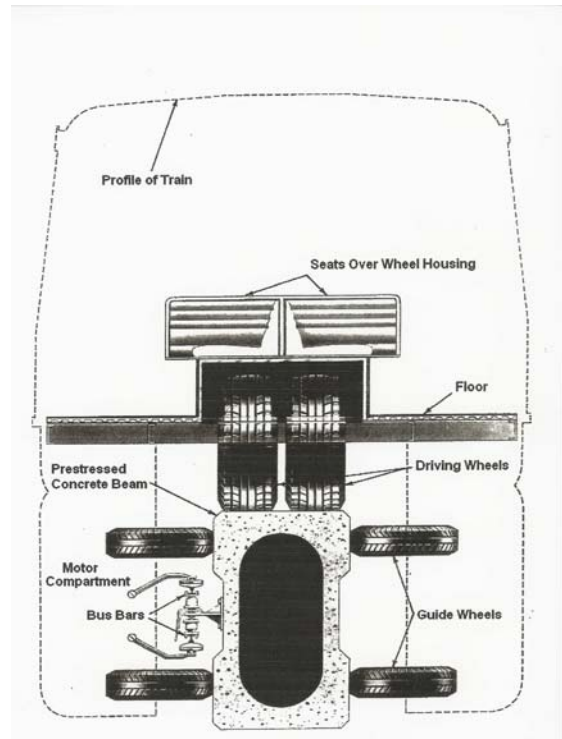
Illustration 1
Wuppertal Monorail

2. Monorails that envelope and straddle a beamway

A typical and most applied monorail world wide is the **Alweg** Monorail Concept, which envelopes and straddles a narrow deep beamway. The Alweg vehicle is supported by 2 bogies, each having **load bearing wheels on the top of the beam, and is guided by 2 rows of stabilizing wheels along each side of the beamway**. In this concept the beamway is an essential part of the vehicle system either when elevated or at surface (Illustrations 2 and 3). Switching of the Alweg is complicated and involves flexing the massive beamway. The first full size Alweg system was installed in Turin, Italy, 1956, then in Seattle, USA 1962 and several in Japan later.



**Illustration 2
Alweg Monorail
on an Elevated Guideway**



**ALWEG MONORAIL
SEATTLE, WASHINGTON**

**Illustration 3
Alweg Monorail Cross Section**

3. Monorails that *run on top of a beamway or a slab at surface*

A typical one is the new monorail technology trade named **Urbanaut®**, which has a **unique central guide rail on top of the beamway that prevents uplift and derailment of the vehicle**. (Illustration 4) There is extensive information on this new monorail technology on the website "urbanaut.com". The Urbanaut® needs only a concrete runway slab at surface and is approximately half the size and weight of the Alweg. Urbanaut® has the smallest and least costly cross-section area requirement in capacity comparison of any comparable elevated surface or subsurface transit. Switching of the Urbanaut® is done by simply flexing the central rail.



Illustration 4
Urbanaut® Monorail on an Elevated Guideway

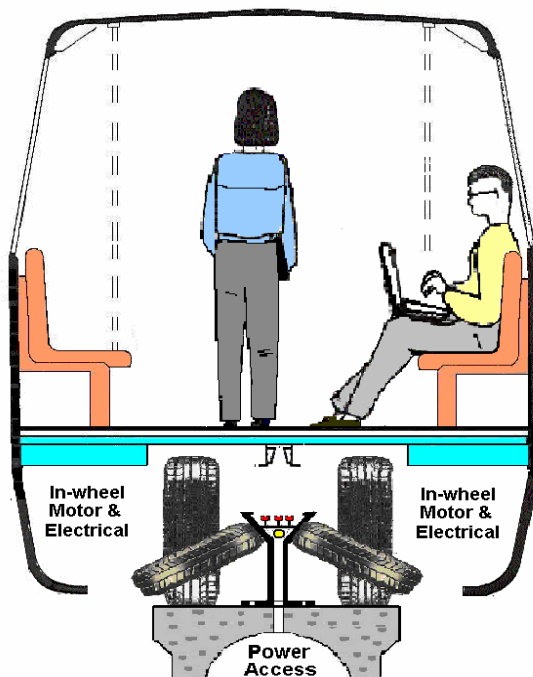


Illustration 5
Urbanaut® Monorail Cross Section

The high speed Transrapid Maglev vehicle system in Shanghai, China is **not a monorail** because the guideway is more than 3.0 meters wide, and is one of the widest and most expensive guideway of any transit including the New York Subway. The Transrapid Guideway is close to 4 times as wide as the Alweg and 3 times wider than the Urbanaut® beamway and therefore cannot be classified as a monorail.

This definition of monorail, descriptions and illustrations of the 3 basic classifications of monorails is by Einar Svensson, an experienced professional engineer who is recognized as a world authority on the theoretical, practical, economic and feasible application aspects of monorail technology.