

# Funicular Railways



 ... to innovation.

 From tradition ...



2

Tbilisi  
The city that loves you

1

Tbilisi  
The city that loves you

## The utmost in ride comfort

---

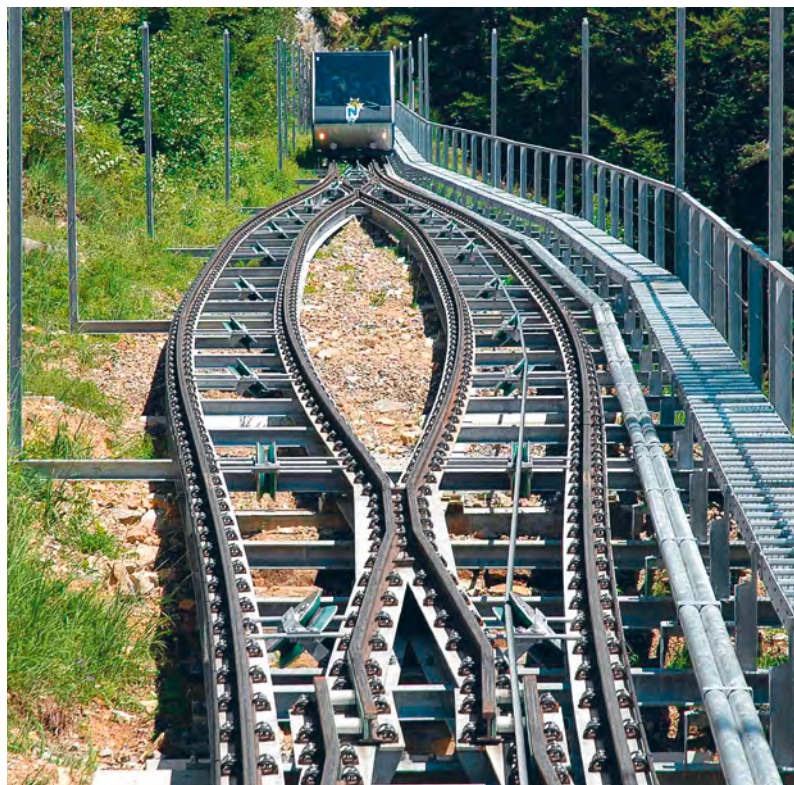
As a Doppelmayr/Garaventa customer, you benefit from leading-edge ropeway technology. We set the benchmark for transport systems geared to the future. Technology, innovation and performance have enabled us to win customer trust and made us the number one supplier in the world market.

With the first funicular railway construction in 1885, Doppelmayr/Garaventa has more than a century of experience. Funiculars can be built almost anywhere: in cities, in the country, or in mountain regions. Curves and changes in gradient can be mastered by this ropeway system without any problem. The funicular can be equipped with intermediate stations, which makes it ideal as a means of public transport.

Whether travelling in individual vehicles or trains, passengers always enjoy a very high level of ride comfort. The low profile ensures high availability for the funicular in all weather conditions. The impressive features of these systems include a long service life of around 40 years and moderate maintenance costs.

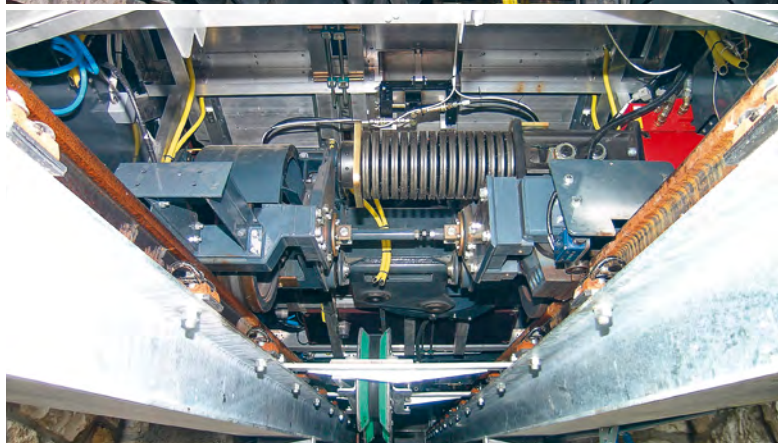
In addition to installations with attendants, today's fully automated funiculars can operate without cabin attendants, are extremely reliable and offer operators additional economic benefits. Thanks to their high image value, funiculars can represent a major marketing factor for their operators.

↗ Over 125 years  
of transport history



## The system in brief

---



Funiculars are exceptionally resilient to wind and weather. One or two vehicles or groups of vehicles connected together in a train run on a fixed track – primarily on rails. The vehicles are propelled by a haul rope and usually on the basis of a reversible system. Whereas two parallel tracks are possible for short distances, on longer installations a single track is used with a passing loop in the middle of the line.

The vehicles, which run on the track, are connected to one another by means of the haul rope, which is propelled by the drive (usually in the top station). Systems with a counter rope are also used, depending on the gradient and the location of the drive.

This rope is loaded with a hydraulic cylinder or a counterweight in the return station in order to generate the required tension force.

In addition to this most frequently used configuration, Doppelmayr/Garaventa builds funiculars in special constructions. Specific customer requirements such as a single track or winch drive as well as other design details can be accommodated without any problem. Trains consisting of one or more vehicles, which can carry several hundred passengers and travel at speeds of up to 14 m/s, provide very high transport capacities.

 Durable and efficient






## Well-conceived down to the smallest detail

---



Drive and return sheaves, gearbox, service and emergency brakes, couplings, primary, auxiliary and emergency drives, deflection sheaves, haul rope tension system, electrical equipment and control system – these are essential components that are housed in the stations. Usually that's not a problem when building a new installation; however, in cases where new ropeway components have to be integrated into existing stations, it's the many years of experience and the know-how of Doppelmayr/Garaventa that make the difference.

The optimal concept – including unconventional solutions – is developed and implemented in close collaboration with the customer and with in-depth knowledge of the applicable codes and standards (CEN, ANSI, EU Directive 2000/9/EC on cableway installations etc.).

 Experience and know-how  
from the number one supplier

## Customized and comfortable

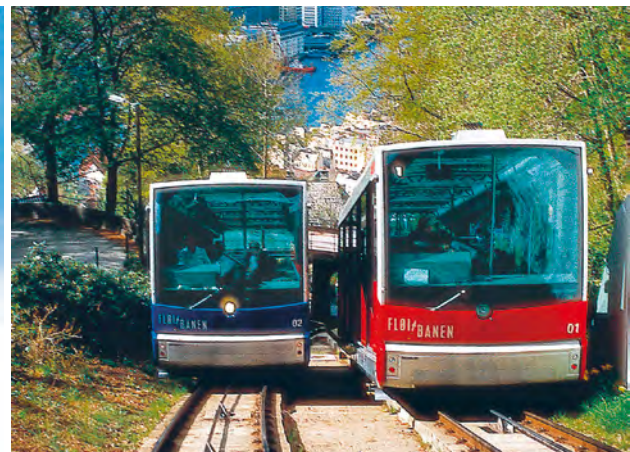
---

The visual image of the funicular is defined by the vehicles – as a rule two, or in exceptional cases, just one. The vehicles or trains are available in a wide variety of designs and sizes according to the exact needs of the customer and travel along the rails on their spring-mounted bogies or single-wheel suspensions.

A major benefit of the funicular is its ability to transport cargo – whether with a separate carrier or by means of a material platform fitted to the vehicle.

An automatic levelling system is also available for the vehicles. This offers wheelchair users and passengers with strollers or bicycles a level vehicle floor throughout the entire trip.

 Comfort at the highest level





## Highlights

- **1997** 120-FUL "Sierre – Crans-Montana", Sierre Switzerland – Switzerland's longest funicular with a transportation length of over 4 km in a single section
- **2001** 125-FUL "Fun'ambule Université Gare", Neuchâtel, Switzerland – the world's first funicular with level compensation
- **2006** 375-FUL "Taksim – Kabatas", Istanbul, Turkey – with exceptionally high transport capacity of 7,500 PPH
- **2009** 400-FUL "Ocean Park", Hong Kong – funicular for 400 passengers inspired by Jules Verne in an amusement park
- **2013** 84-FUL "Scenic Railway", Katoomba, Australia – funicular with inclination of 52°/128%



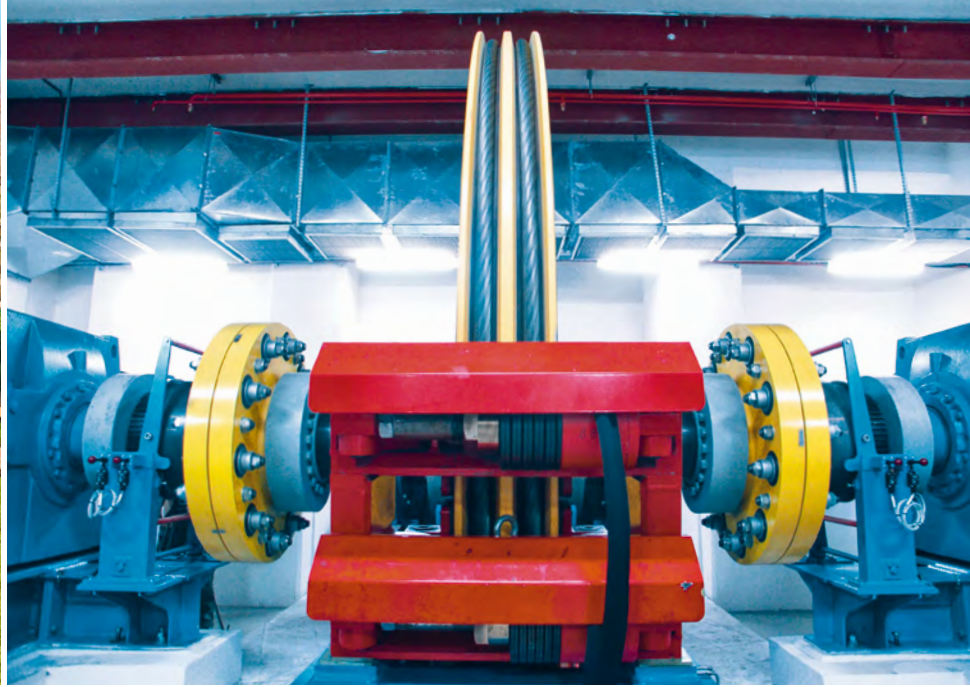
## Safety guaranteed

---



Unlike other ropeway systems, the funicular lends itself to a wide range of track layouts. The line can be straight or curved, lead over bridges and viaducts, and pass through tunnels. The track substructure can consist of conventional ballast beds as well as steel girders or concrete structures. The rails are secured to the track substructure with special rail fasteners at intervals of approximately 80 cm. Line sheaves ensure smooth guidance of the haul rope. Ropeways, including funiculars, rank amongst the safest means of transport in existence. This is due to extensive experience and the many safety devices used.

Hydrostatic auxiliary or emergency drives ensure that the vehicles can be safely brought back to the stations in the event of a failure, such as a power outage. If the funicular is blocked, the passengers have to be evacuated from the vehicles. This is a relatively straight forward operation thanks to the steps along the track. In the event of overspeed or a slack haul rope, the rail brakes incorporated in the bogies are engaged. These firmly grip the rails and bring the vehicles to a safe stop.



## Key features at a glance

- » extremely well-suited for use in mountain regions or for urban transport
- » curves and intermediate stations can be included in the track layout
- » optimal availability in all weather conditions
- » ideal for carrying passengers and freight, and for combined transport
- » very high transport capacities
- » high ride comfort
- » new economic perspectives with fully automatic funiculars
- » long service life and high operational efficiency
- » marketing factor for the operators



363/eng/gama/bb/032013/1000

**Doppelmayr Seilbahnen GmbH**  
Rickenbacherstraße 8–10, Postfach 20  
6922 Wolfurt / Austria  
T +43 5574 604, F +43 5574 75590  
dm@doppelmayr.com, www.doppelmayr.com

**Garaventa AG**  
Tennmattstrasse 15  
6410 Goldau / Switzerland  
T +41 41 859 1111, F +41 41 859 1100  
contact@garaventa.com, www.garaventa.com