



We move people.

MiniMetro®

Cairo (airport)



Frankfurt (airport)



Urban and legendary.



The new landmark of an ever growing number of cosmopolitan cities: MiniMetro, the innovative rail-based, rope-driven people-mover for automated short-distance transport with amazing transport capacity, operating efficiency, space economy and flexibility in adapting to cityscapes.

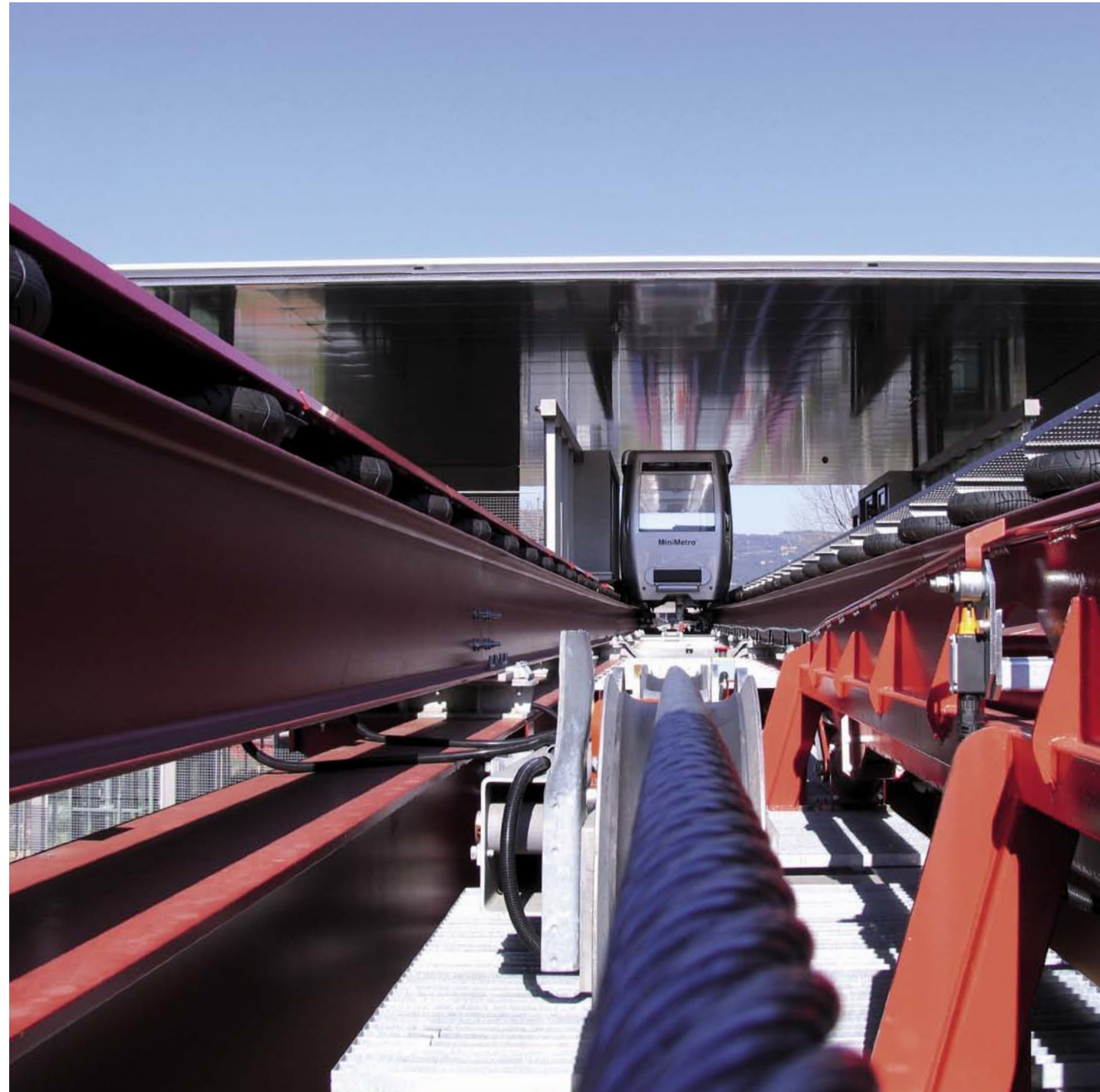
Modern urban management:

- providing timely and speedy mass passenger transport
- protecting the environment
- investing in mobility
- maintaining the budget
- enhancing quality of life
- maximizing efficiency

MiniMetro - the innovative urban transport system:

- low cost
- attractive
- a great alternative

Keeping cars and busses off the streets.



Attractive public transport.



Detroit (airport)



Innsbruck (Hungerburg)



Frankfurt (airport)



Zurich (airport)



MiniMetro: Recommended by leading cities.

Covering short to medium distances, MiniMetros connect urban centers, event locations, shopping malls, recreational areas, airport-terminals and tourist attractions.

Perugia loves its “Linea Rossa” because once every minute it is ready for boarding.

Innsbruck’s MiniMetro was included in the ›Design 100‹ in Time Magazine’s worldwide ranking.

Frankfurt’s MiniMetro turns heads with its futuristic bridge design.

Zürich’s Skymetro connects the Airside Center with Dock E, running in two parallel tunnels crossing under an airport runway.

Cairo’s MiniMetro is the backbone of efficient passenger transport at the new airport.





Famous architects
are thrilled to come aboard.



Landmark architecture for modern urban transport:

Jean Nouvel connected the hilltop crested by Perugia's old town with the bustling city below with attractive red-painted rails. Giving comfortable access to Perugia's tourist attractions, the "Linea Rossa" quickly became a landmark in its own right.

Zaha Hadid created spectacular station buildings for Innsbruck's Hungerburgbahn, which crosses the river Inn on its own bridge, connecting the city centre with the surrounding mountain peaks in one majestic sweep.

Temporary site-specific MiniMetro installations also made architectural history in **Matteo Thun's** "Cloud Roof" for Hanover's Expo-cableway and the iceblock-shaped stations created by **Vicens + Ramos** in Zaragoza.

Perfect solutions convince traffic planners world-wide



Grenoble (Research centre)



Barcelona (Subway connection to Montjuïc)



Porto (connection between two urban districts)



Naples (inner city connection dating back to 1891)

Terrain, building density, increased environmental sensitivity and growing financial pressure add up to a variety of traffic planning problems which find elegant, yet cost efficient solutions in the MiniMetro technology platform.

On routes of up to 8 kilometers, MiniMetros offer urban transport capacities comparable to buses and trams, while occupying a relatively small footprint and climbing slopes which competing transport systems cannot surmount – at least not without huge additional technical complications.

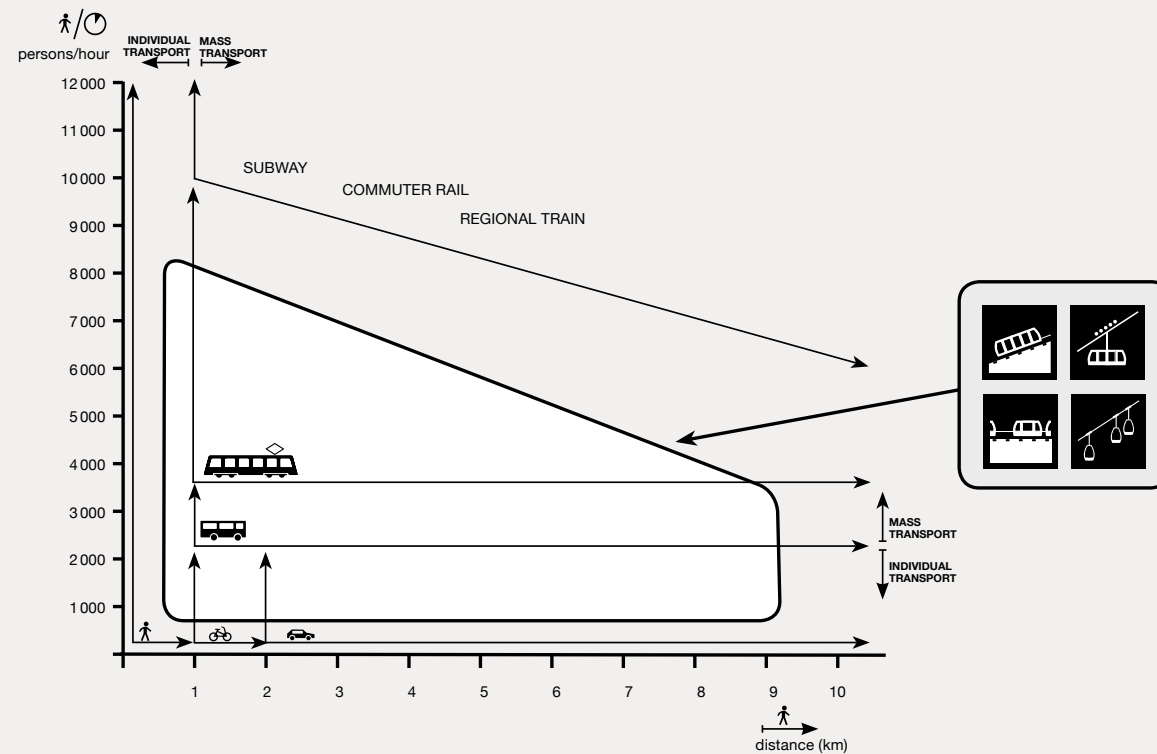
Serial Winner in System Comparisons.

There is no “best” urban transport system – only the best for the individual application defined by capacity needs, terrain and said urban environment.

With a capacity of up to 8,000 persons/hour, MiniMetros fit the gap between busses (3,500) and trams (10,000), while surpassing both in punctuality, reliability and availability; especially those that share their routes with other traffic participants. MiniMetros routinely act as efficient links between other mass passenger transport systems.

Additionally, MiniMetros excel on very short routes: As automated inclined elevators they easily conquer short steep inclines.

Perugia



archives: "The Renaissance of the Cabelway"



Eight very convincing arguments

Detroit (airport)



- 1** Spectacular routing: MiniMetros climb steeper inclines and turn tighter turns than any competing system. This greatly reduces the total transport system footprint.
- 2** Visible attractiveness and comfort: Passengers do not need to study schedules because the carriers arrive at regular and if necessary, very short intervals.
- 3** Superior reliability: MiniMetros run on their own tracks and always arrive on time - even when street traffic has come to a complete congested standstill.
- 4** Maximum energy efficiency: One drive system with redundant design of all vital components propels all carriers on the track. During deceleration the motor converts to a generator, thereby feeding energy back onto the grid.
- 5** Efficient energy usage: MiniMetros always draw the optimal amount of energy for the actual passenger load, saving huge amounts of power.
- 6** Lower labor costs: Vehicles for up to 50 passengers operate without on-board staff, greatly reducing operating costs.
- 7** High capacity: With up to 8,000 passengers per hour in each direction at speeds of up to 14 m/s (ca. 50 km/h), MiniMetros compete head to head with any urban transport system.
- 8** Cost saving from the start: MiniMetros require lower initial investments and operation costs than all other urban transport systems. Thus they are ideal for successful public-private partnerships, as convincingly proven in Innsbruck (Hungerburgbahn) and Bolzano (Rittner Seilbahn). In both cases, a complete turnkey system could be put into full, unrestricted operation from day 1 after commissioning.

Exemplary in technology and application.



Oeiras (connecting the railway station with the business center)



Oeiras

MiniMetro is a fully developed technology platform which easily adapts to the demands of a given environment and transportation requirement.

The defining characteristics of all MiniMetro solutions are the separation of the drive system and the carrier, and the haul ropes which connect those carriers to the drives.

MiniMetros are a rail-based, fully automated means of transport. As funiculars or inclined elevators they cover short routes with bends and considerable differences in altitude, rolling on steel wheels, pneumatic tires, or gliding on air cushions.



Milan (Hospital San Raffaele)



Perugia

Frankfurt



Two systems – one huge success.

Perugia



Funiculars offer very flexible routing: straight and around bends, uphill and downhill. The size of the carriers varies, and single carriers can be connected to form trains. With speeds of up to 14 m/s, funiculars are the fastest ropeway and offer the very best reliability and availability to meet public transport demands. They also meet the strict technical requirements of ropeway operation.

| Technical Features - Funicular | |
|--------------------------------|----------------------|
| capacity | up to 8,000 pers/hr |
| speed | up to 14 m/s |
| carrier capacity | up to 400 passengers |

Inclined elevators use the basic technology of vertical elevators to cover very short, steep routes. Being fully automated, they normally operate without staff.

| Technical Features - Inclined elevator | |
|--|---------------------|
| avg. capacity | 600 Pers/hr |
| speed | up to 4 m/s |
| carrier capacity | up to 40 passengers |

A shining example of an inclined elevator is the fully automated train on Montmartre in Paris, France. Two completely separate carriers with a capacity of 60 passengers each deliver up to 3,000 visitors per hour to the top of this famous hill, offering breathtaking views of the Sacré-Coeur basilica through glass roofs.

Innsbruck



Innsbruck



Paris (Montmartre)



Two operation systems.

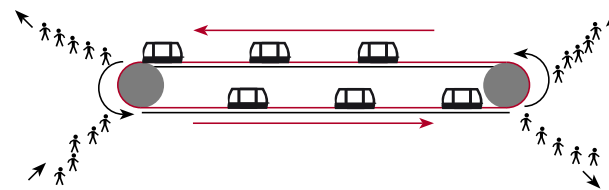
MiniMetros can be designed for either **circulating** or **jig-back operation**.

In the circulating design the haul rope forms an endless loop, with the cabins or cars evenly spaced along the cable and rotating along the track always in the same direction.

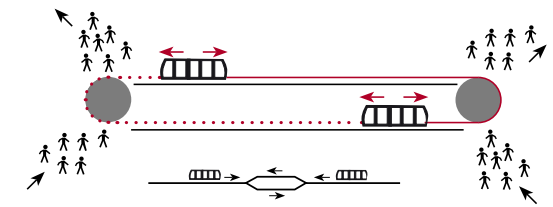
In jig-back operation two cabins or cars, or sometimes clusters of small cabins, go to and fro on the same side of the track.

Circular operation is continuous, with transport capacity depending on carrier size and interval. With jig-back design, passengers enter and exit in groups.

The cable grip which connects the carrier to the haul rope can be fixed design or automatically detachable, with the latter used on circulating short-distance passenger transport systems. Here, the grip opens automatically at the station entrance, transferring the carrier to a conveyor system which decelerates or completely stops the carrier for comfortable passenger entry and exit.



Circular operation



Jig-back operation

**Technical features,
detachable in circular operation**

| | |
|-------------------|-------------------------|
| max. capacity | 3,000 pers/hr/direction |
| min. interval | 60 sec |
| max. incline | 12% |
| min. curve radius | 50 m |
| section length | up to 4 km |
| max. speed | 22-30 km/h |



Perugia

**Technical features,
fixed grip in jig-back operation**

| | |
|-------------------|-------------------------|
| max. capacity | 8,000 pers/hr/direction |
| max. incline | 12% |
| min. curve radius | 50 m |
| section length | up to 4 km |
| max. speed | 36-50 km/h |



Cairo

Perugia, for example: The “Linea rossa”.

Perugia: An Italian regional capital with over 3,000 years of history and a charming, bustling old town on top of a steep hill, accessible only by extremely narrow, winding roads.

Setting a goal of minimizing car traffic, the city installed an intelligent combination of escalators and elevators, offering quick and barrier-free access to Perugia's old town. These successful moves towards soft mobility were crowned by the installation of a MiniMetro in 2008. This funicular with up to 25 cars, each for up to 50 passengers, runs from a large park&ride at Pian di Massiano in Perugia's outskirts through a recently developed residential area to the railway station. From there through a tunnel up the hill into the old town, connecting five stations on a three kilometer track in 60 second-intervals: For passengers of the “Linea Rossa”, train schedules and boring waits are a thing of the past.

The nickname “Red Line” refers to famous architect Jean Nouvel's design approach: By integrating highly functional station design and flashy red-painted tracks he designed a new, elegant and innovative accent which fits perfectly into Perugia's cityscape.





- the city:
Perugia – 160,000 inhabitants
- the task:
access to the historic old town
- the MiniMetro:
detachable funicular on pneumatic tires
- the cars:
25 for 50 passengers each
- the track:
length 3,015 m - elevation 161 m
- the capacity:
3,000 passengers/hour/direction
- the success:
3 million passengers/year
- the average availability since commissioning:
99.9%



Frankfurt, for example: The Sqaire Metro.



- The Frankfurt airport:
60 million passengers/year
- The task:
connecting a mega-office building with its parkade
- The MiniMetro:
fixed grip funicular on pneumatic tires
- The track:
300 m
- The interval:
two minutes
- The capacity:
1,500 passengers/hour/direction

Frankfurt Airport: Continental Europe's busiest passenger hub and a vital infrastructure of a globally connected financial metropolis. This is the site of The Sqaire, an avantgardistic "New Work City" of almost half a mile long and 140,000 square meters of usable space. In short: one of the world's largest office buildings.

Searching for a reliable, fast and efficient link between the Sqaire and its 2,500 car parkade, the developers chose a MiniMetro solution for unsurpassed comfort, maximum reliability, environmental-friendliness and minimal operating costs. The Sqaire Metro operates fully-automatic 24/7, covering the 300 meter distance between office building and parkade, including the crossing of a motorway, another main road and a railway line in a short 80 seconds. All the while providing passengers a spectacular view from 18 meters above ground: The Sqaire Metro runs in a 5 by 5 meter framework, supported by eight steel columns: the so-called skylink.

Cairo, for example: The Terminal-Shuttle.

Booming Cairo International Airport, already one of the Middle East's busiest airports, was searching for an efficient transport solution to connect its three terminals. Continuously growing passenger numbers made speed, availability, reliability and longevity the most important criteria for the selection. The system of choice was an innovative air cushion-based MiniMetro solution: offering high speed, noiseless comfort, a record low in emissions with futuristic design. Thus creating a convincing, future-proof solution for a rapidly growing airport.

- The Cairo airport:
22 million passengers/year
- The task:
Connect airport terminals T1 and T2/T3,
a shopping center and parkades
- The MiniMetro:
jig-back funicular on air levitation
- The track:
1,857 m
- The interval:
Every 5 minutes at a speed of 13.5 m/s
(50 km/h)
- The capacity:
2,000 passengers/hour/direction
- Carriers:
2 with 170 passengers each







- The city:
Innsbruck – 120,000 inhabitants
- The task:
Connect the inner city with an alpine recreational area
- The MiniMetro:
fixed grip funicular on rails
- The track:
1,800 m - elevation 288 m
- The capacity:
1,200 passengers/hour/direction
- The success:
40,000 passengers/month

Innsbruck, for example: The Hungerburgbahn.

Commissioned in 2007, Innsbruck's new Hungerburgbahn replaced a 100 year old ropeway connection, opening new dimensions for municipal public transport. The new MiniMetro begins in the town centre, via two stations up to the Hungerburg quarter with its tourist attractions including 'Alpenzoo', there connecting with skytrams to the alpine mountain landscapes surrounding Innsbruck. The result is a high-capacity connection from the city center at 560 m via Hungerburg (886 m) and Seegrube (1,905 m) to the Hafelekar at 2,330 m above sea level. The new Hungerburgbahn was built by a public-private partnership. It is an integrated part of Innsbruck's public transport system and its tariff regulation, with the operation schedule coordinated with the requirements of the city's inhabitants. The Hungerburgbahn proudly ranks among Time Magazine's 'Design 100'. With the soft-flowing lines of Hungerburgbahn's station buildings, famous architect Zaha Hadid, also creator of Innsbruck's new Berg Isel ski jump, has added a futuristic accent to the cityscape.



Zurich, for example: The Skymetro.

Zurich is a financial hub, a tourist destination, a city of culture - and a life quality world champion. Since 2003, the city is also a MiniMetro location: At Zurich Airport, the Skymetro links the Airside Center with dock E. Hovering on a 1.5 millimeter air cushion, the Skymetro runs through two parallel tunnels, making this connection in just two short minutes. Both trains have two cars with a capacity of 112 passengers each, with an optional third car in reserve to cover peak demand. In 2006, 160 lightboxes were installed in the tunnels, with flipbook-like pictures forming a short movie clip to entertain the passengers of the passing trains.





- The Zurich airport:
36 million passengers/year
- The task:
Internal airport shuttle service
- The MiniMetro:
fixed grip funicular on air levitation
- The track:
1,138 m - elevation 0 m
- The Capacity:
4,480 passengers/hour/direction
- Year commissioned:
2003

Sustainable and integradable.



For Perugia's Mayor Renato Locchi who considers walking to be the most important form of mobility in the town center, the Minimetro which opened in 2008, represents the new backbone of his mobility policy which is highly oriented toward sustainability.



For Innsbruck's Mayor Hilde Zach it was clear from the very beginning that the new Hungerburgbahn in Innsbruck had to be conceived not only for tourism, but also as a means of interurban local transport. For that reason, when compared to the old funicular, the valley terminal was moved to the city center. The new cableway has been fully integrated into the Innsbruck public transit system.

