STATE OF THE ART OF THE 3S TECHNOLOGY

Giorgio Pilotti
Tricable ropeways combine the benefits of aerial tramways and detachable gondola ropeways.

The first installation of its kind, the Alpinexpress in Saas Fee, was realized in 1991.

Source: https://www.bergbahnen.org/lexikon/Kapitel8.php#5
Multiple cable solutions guarantee increased wind resistance and are able to cross spans of approx. 3,500 m. This makes for a perfect application over steep and exposed terrain.

Grips are detachable, meaning that the system has a very high transport capacity.

- **Capacity** up to 6,000 p/h
- **Speed** up to 8.5 m/s
- **Cabin capacity** up to 35 people
Production techniques similar to those found in aircraft construction are used for critical safety components.

Milling parts from one piece reduces the need for safety welds.

+ Increased construction stability
+ Reduced need for maintenance and inspection
+ Optimum safety
Additional rollers

In stations and garages, the carriage runs on additional rollers. This allows it to travel around even the tightest bends.

+ Flexibility

+ Compact station design
The new 3S cabins by LEITNER ropeways bear the mark of Pininfarina, the famous designer of Ferrari and Maserati sports cars.

The cabin design and comfort span the ideal bridge to the automotive world: advanced technology, aesthetics and functionality in equal measure.
STATE OF THE ART OF THE 3S TECHNOLOGY

Technical highlights – 3S cabin Symphony

Ventilation

Lights

Seats
Technical highlights – Patented hauling cable rollers with spring system

The lift-off load on the hauling cable is minimized by the spring roller system on the support towers.

The lower lift-off height results in fewer vibrations on the hauling cable and considerably lower loading of the support cables by the carriage rollers.
LEITNER 3S systems only require four sheaves.

**Drive station:**
Two drive sheaves and one return sheave

**Return station:**
One return sheave

**Increased service life of the hauling cable thanks to the low number of bend cycles.**
Optimum redundancy for maximum safety

If required, an independent drive can be installed for both drive sheaves.

This is also the case for the emergency drive/evacuation drive.

+ Redundant design for maximum safety and availability.
Optimum redundancy for maximum safety

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+ Redundant design for maximum safety and availability.
Technical highlights – Optimized accessibility

Stations are very easily accessible.

All mechanisms are directly accessible and thus easy to check and adjust.

The outer station turnaround is accessible while walking upright. This enables ergonomic and safe working.
The switch points are designed for **optimum flexibility**.

The rapid switching cycles allow the vehicles to be pushed in and out during operation. The garaging procedure can be executed at running speed. The compartment-style system enables manual control of the switch points.
LEITNER 3S stations are highly compact.

The low installation height reduces cubage and costs.

The new 3S carriage permits minimal curve radii in the station and the very narrowest curves in both directions in the garaging area which enables additional space saving.
STATE OF THE ART OF THE 3S TECHNOLOGY

REALIZED AND CURRENT TRICABLE PROJECTS
STATE OF THE ART OF THE 3S TECHNOLOGY

Realized project – TD35 Ritten / Renon / IT

First tricable gondola realized by LEITNER ropeways in 2009.

4,544 m
949 m
550 p/h
900 kW
8
7
Longest 3S gondola in the Alps with a total length of about 4,7 km

Height difference 1,200 m

48 cabins of the Italian designer Pininfarina

Transport capacity 3,000 p/h

7 Towers

Travel time 12 min
STATE OF THE ART OF THE 3S TECHNOLOGY

Realized project – TD32 Eisgratbahn / AT

Highlights

First tricable gondola which consists of 2 sections. The vehicles can pass from one section directly to the other one through the middle station.

The middle station was attached to the already existing station of the „Gamsgartenbahn“.
Realized project – TD32 Eisgratbahn / AT
Line – Section 1
Realized project – TD32 Eisgratbahn / AT
Line – Section 2

Middle station

Tower no. 5

Tower no. 6
Realized project – TD32 Eisgratbahn / AT

VIDEO
TD32 EISGRATBAHN
Highest top station in the Alps at around 4,000 m
Inclined length 3,760 m
Height difference 900 m
Transport capacity 2,000 p/h
Construction time 3 years
3 Towers
Completion 2018
Current project – TD28 Trockener Steg – Matterhorn Glacier Paradise
Due to long spans and other local conditions it can be necessary to install a wider gauge. In the case of Zermatt, the top station will be fitted directly to the rock which means that limited space is available. In order to meet all the requirements, the gauge has to be reduced; the line continues conically towards the station.
Current project – TD28 Trockener Steg – Matterhorn Glacier Paradise

Highlights

To reduce the rock excavation and to meet the special requirements (available space is limited) it was necessary to slightly deflect the rope on tower no° 3.
Current project – TD28 Trockener Steg – Matterhorn Glacier Paradise
Current project – TD28 Trockener Steg – Matterhorn Glacier Paradise