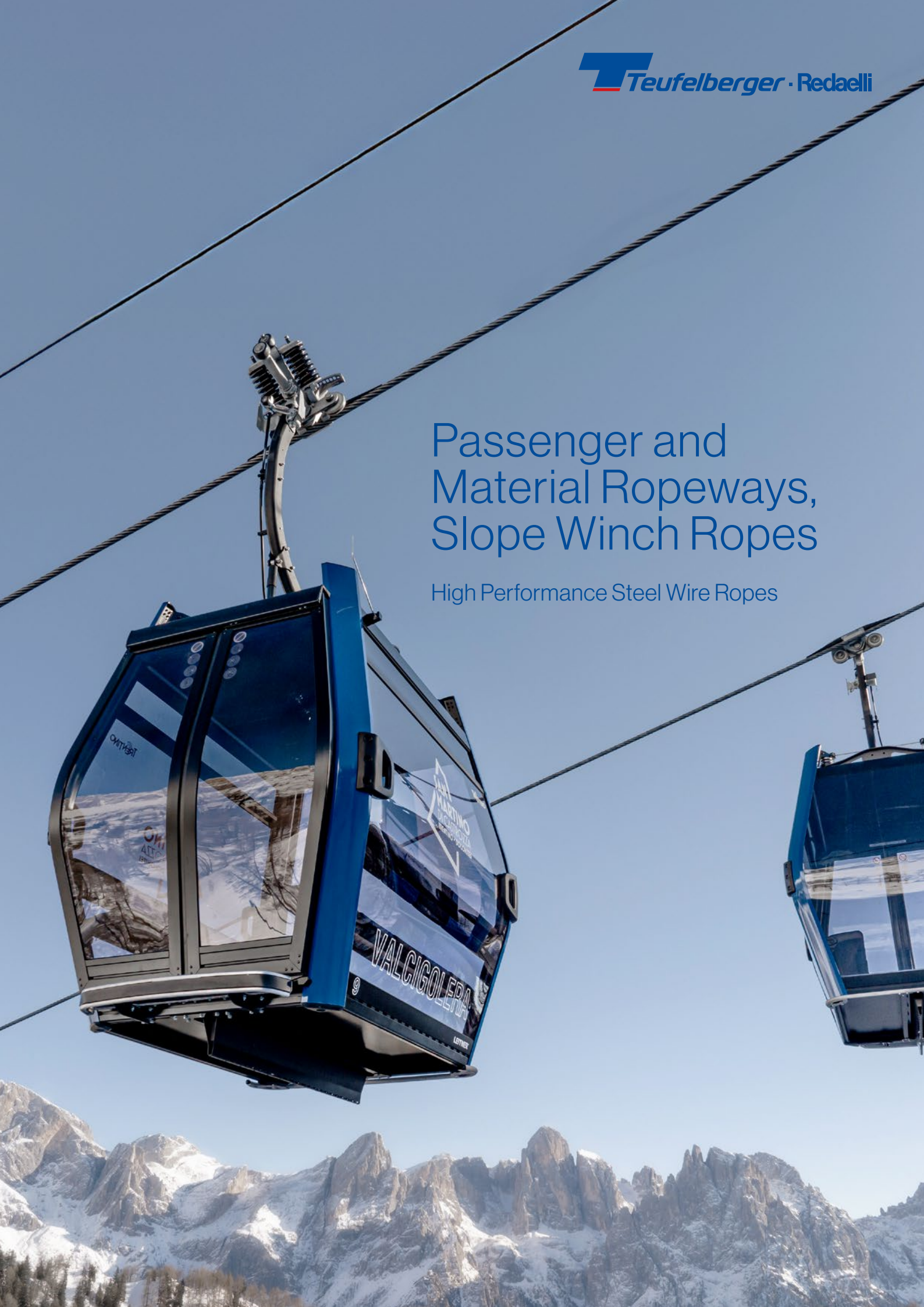
Teufelberger · Redaelli

Passenger and Material Ropeways, Slope Winch Ropes

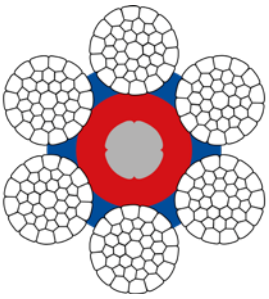
High Performance Steel Wire Ropes



Explanation of symbols

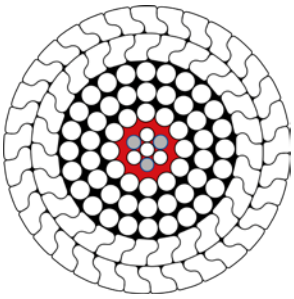
Cross-section

Plastic sheating

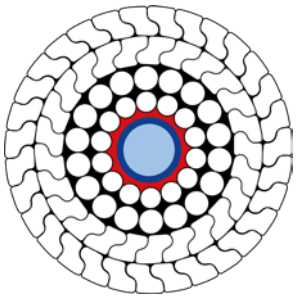


support profiles

fiber core



optical waveguide



electric conductor

WARNING

Using these products may prove hazardous. Therefore, never use our products for purposes other than those they were designed for. Customers must ensure that all persons using these products are familiar with their correct use and the related necessary safety precautions. Please bear in mind that any of these products may inflict harm when used incorrectly or subjected to excessive loads.

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Contents

Our reference projects:

We are Teufelberger

Teufelberger Group CEO:
Florian Teufelberger

Family-owned for 7 generations

1,400

employees

14

locations around the globe

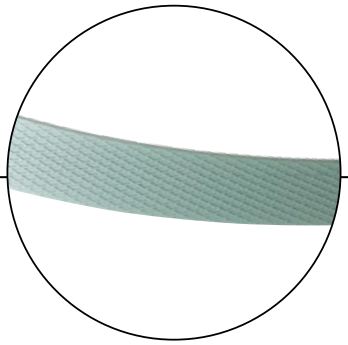
One Company – Infinite Possibilities

What started back in 1790 as a simple shop making hemp ropes has since evolved into a globally successful group of enterprises developing custom-tailored solutions for fiber ropes, steel wire ropes, and strapping. The continuity and stability of our family-owned group make us a reliable partner. We support you in tackling your day-to-day challenges and cooperate with you in the spirit of mutual respect and equality.

Global network and market proximity

Our global network and our 14 locations around the globe, with production sites in Austria, Italy, Poland, Thailand, the Czech Republic and the US, enable us to cooperate closely with our customers and to cater to the specific needs of the various markets in which the Teufelberger Group is present.

It's our joint success
that counts



Fiber Rope

Safety & Rescue Ropes
Treecare & Forestry Ropes
Yachting Ropes & Kite Lines
Industrial Fiber Ropes
Climbing Ropes

Wire Rope

Cableway Ropes
Crane & Industrial Ropes
Offshore Ropes
Mining Ropes
S&S / Teci
Tensostructures

Strapping Solutions

PET Strapping
PP Strapping
better.collect

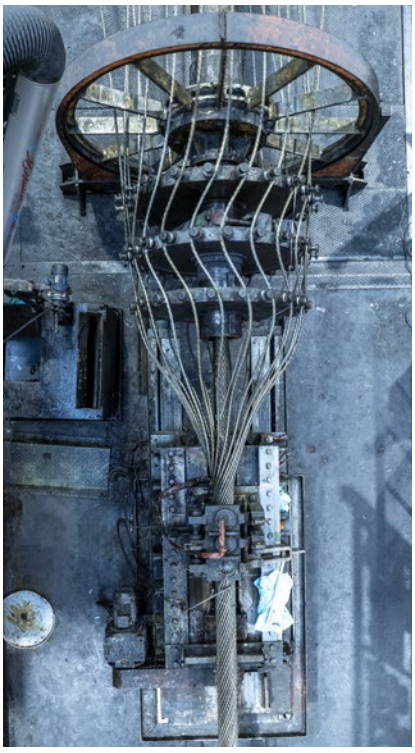
Innovative products of superior quality

Our expertise in a wide range of technologies has generated numerous synergies between our various divisions, much to the benefit of our customers. By assigning five percent of our workforce to research and development, we ensure that our customers have always access to cutting-edge technologies. In addition to ensuring the consistently high quality of all our products across all segments, we also attach great importance to upholding social and environmental standards in our day-to-day work.

Solutions that fit your needs

We at Teufelberger-Redaelli develop and produce high performance steel wire ropes in close cooperation with our customers. Together, we develop solutions that create added value by enhancing the efficiency and safety of your applications.

Being a family enterprise, we attach particular importance to building successful, long-standing business relationships. Our task is not limited to the delivery of premium-quality steel wire ropes. Rather, our experts in product development, application technology and sales support you throughout your entire work process.



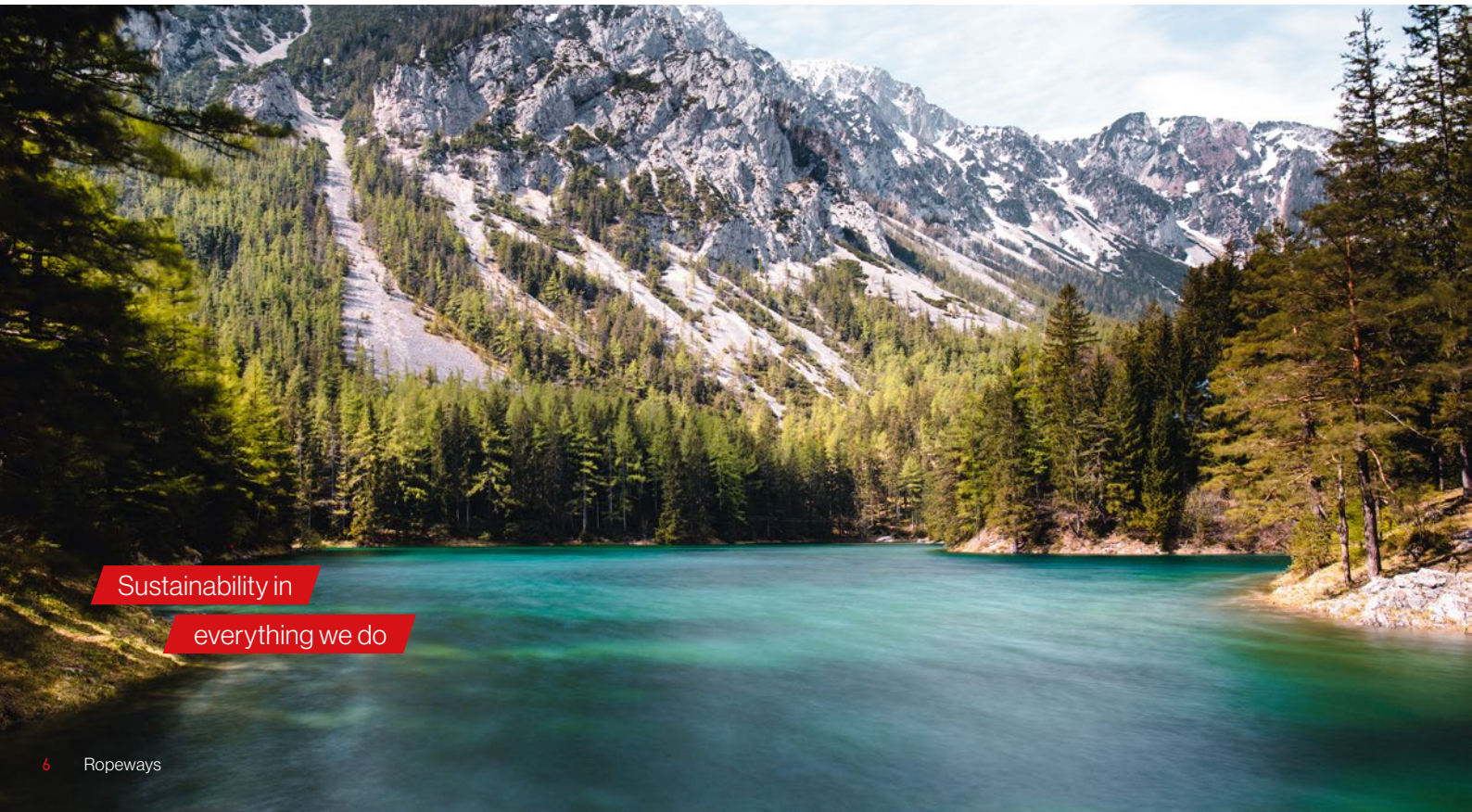
Sustainability at Teufelberger

Our commitments

With its Agenda 2030 for Sustainable Development, the United Nations has set a milestone for the future when it comes to spurring worldwide economic progress in harmony with social justice and the ecological limits of our planet. Based on the goals of this agenda, Teufelberger has developed five relevant, group-wide commitments in order to promote sustainability:

1 To **create** added **value** for employees and the region

2 To **protect** our **resources**



Teufelberger, a 7th generation family-run business, looks back on more then 230 years of company history. Its continued successful development over such a long period of time has only been made possible through resource-saving and sustainable thinking and acting. “Sustainability in everything we do” has been a principle guiding us since 1790. In order to ensure the future existence of our company, we are now setting the course for the future, with a strong focus on sustainability.

3 To **use** energy **sustainably**

4 To increase **safety** and **security**

5 To achieve **progress** through **innovation** and **technology**

Our goals

An essential part of a successful sustainability strategy is to set ambitious goals and to pursue them consistently. Teufelberger has defined the following group goals for the period until 2030:

- to reduce our company’s carbon footprint by 35 %
- to reduce production waste by 20 %
- to only use electric power generated from renewable energy sources
- to only use packaging made from recycled materials
- to implement sustainability plans for all departments
- to promote lifelong learning

In addition to these group-wide goals, every division has also defined various specific goals aligned with, and contributing toward, the group-wide goals. Going forward, the Wire Rope Division will be focussing on the following sustainability goals and projects:

To provide a fully electric infrastructure for its employees

Our vehicle fleet will consist of 100 % EVs. In order to put the necessary infrastructure in place, our plan is to equip one location per year with charging stations for EVs. In addition, we plan to provide e-bikes for travel to and from the local public transport network.

To equip our manufacturing sites with solar power systems

We go beyond electricity from renewable sources (where available) and move toward true sustainability and self-sufficiency.

To reduce production waste by 40 %

This results in an average scrap rate of 4 % of the input materials.

"Doing big small things" program

Every year, we will select at least one activity and one investment idea from employee suggestions in order to address the sustainability issue, take the employee perspective into account, and continuously improve our attractiveness as an employer (employer branding).

Fields of use, as versatile as our products

Our mission: safety, quality, and innovation

Ropeways are no longer only found on mountains. The tasks they perform are increasingly complex, and more and more often they are valued as a sustainable and efficient mobility solution. Whether for ropeways in alpine regions, urban spaces, or as tourist attractions, the requirements on ropes are growing constantly. Our high-performance steel wire ropes ensure maximum safety, longevity, and near-silent operation.

Ropes for:

1. Mountain ropeways

In alpine regions, ropes must withstand extreme conditions. Wind, snow, ice, and year-round use cause high demands on the material and workmanship. Our steel wire ropes have been developed specifically for these conditions: They offer extraordinary tensile strength, a long service life, and minimal elongation to ensure a reliable and safe operation over many years.

2. Urban ropeways

In cities, ropes need not only withstand high workloads but must also run almost silently. Our focus is on low-vibration ropes with optimum transitions to ensure a quiet and comfortable ride. At the same time, our high-grade materials provide for a long service life and minimum maintenance, which is essential for daily use in public transport.

3. Tourist ropeways

Tourist ropeways are often a key element of the visitor experience. Our ropes allow a smooth and stable ride, even over long spans. Due to an innovative manufacturing technology, they offer highest breaking loads, low elongation, and a smooth surface to ensure a safe and comfortable riding experience at minimal noise.

1

2

3

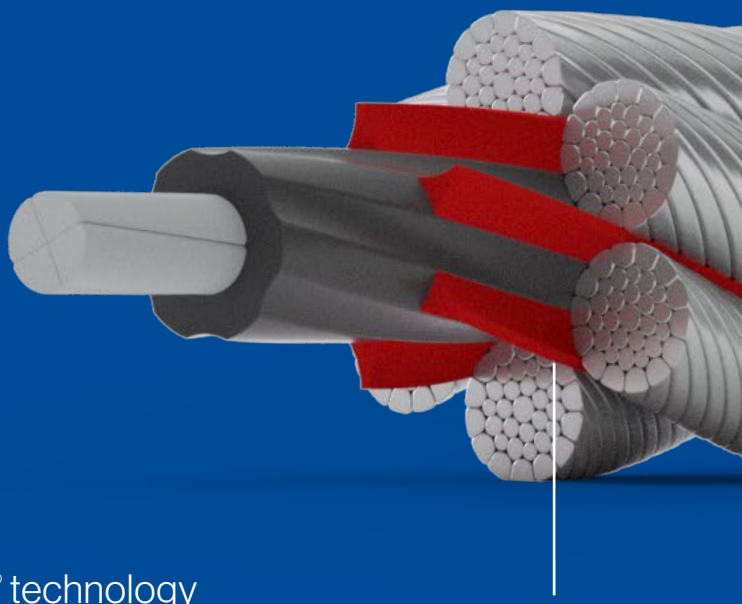
The requirements on ropeways and their ropes are growing steadily. With our many years of experience, cutting-edge technology, and consistent further development, we guarantee top quality, longevity, and efficiency for reliable ropeway solutions in any environment.It is our mission to ensure the highest level of safety, quality, and innovation. Therefore, leading ropeway constructors rely on our expertise. As the official partner and supplier of ropes for ropeways, we deliver to the best of the best: **Bartholet Maschinenbau AG, Doppelmayr, Garaventa, Leitner Poma of America, LEITNER ropeways, Montagne et Neige Développement, POMA,** and **Steurer.**

BARTHOLET Seilbahnen · Doppelmayr · GARAVENTA · LEITNER POMA · LEITNER · MND · POMA · steurer

A technology

that sets new standards

Making high-quality special-purpose steel wire ropes requires precision technologies and comprehensive know-how. That is why we rely on state-of-the-art processes and the highest quality standards, from research and development through to production. Our expertise in high-performance steel wire ropes forms the basis for top-notch performance and long-term success.



Dual Core technology

The Redmont Dual Core consists of a core structured into two layers: The inner layer, a stranded PPC, is covered by an external, compact plastic layer. This offers the following advantages:

- **Plastic embedding** of the strands into the elastic core, increased uniformity, good diametral stability throughout the entire life cycle
- **Little elongation**
- **Radial elasticity**
- Little vibration thanks to **the elastic core** (Dual Core)

Solitec® technology

The structure of a rope determines its quality. One key distinguishing feature of the Solitec® technology are its unique preformed support profiles between the strands. The Solitec® technology offers the following advantages:

- **Long service life** and **consistent rope properties** throughout the entire life cycle
- **Perfect, uniform rope geometry** ensuring fewer vibrations, visible dimensional stability, stable clamping properties for ropeway vehicles
- **Constant geometry** in the area of splices due to the inserted support profiles
- **Movable support profiles:** no stress peaks in the core when running around bullwheels, breakproof cores, reduced fretting corrosion due to defined spacing between strands
- Movement relative to the elements (more pliable than a solid rod) – **smooth travel** around bullwheels

SUPERFILL® compaction technology

This special process compacts every single strand, significantly improving the rope's characteristics.

- **Higher loading limits:** Up to 30 % higher breaking forces than non-compacted ropes
- **Longer service life:** The reduced specific load enhances the durability of the strands
- **Low wear:** The smooth rope surface ensures excellent running behavior on sheaves and drums
- **High durability:** Protection against crushing in multi-layer spooling

Galvanized wires

Our wires are galvanized ahead of the drawing process. This ensures exceptional precision, optimum stability, and a long service life.

Stressless & Stressless Data technology

Stressless is based on the "sliding guide process", a method tried and tested over several decades, and offers the following key advantages:

- **Easy to install** due to its particularly low-twist construction
- Rope hoisting is possible **without a toggle**
- **Safe to handle** as its outer wires are securely integrated into the rope structure

Our revolutionary Stressless Data technology integrates fiber optic bundles securely into ropeway track ropes. Moreover, electric conductors can be integrated into track ropes to supply top terminals with power. This offers the following benefits:

- **highest data security**
- **reduced investment costs**
- **zero maintenance costs**

A reliable partner you can depend on

As an established manufacturer of steel wire ropes for ropeways, Teufelberger-Redaelli offers much more than just top-grade products: We deliver tailor-made complete solutions satisfying highest demands, starting from material ropeways through to urban applications all over the world.

Precision due to digital production control

Our automatic production control guarantees consistent quality and maximum safety in each production step. Due to rope geometry measurements by means of Geometric LED Detection (GLD), the geometric rope parameters diameter, lay length, waviness, and ovality can be measured continuously with the rope in motion.

Powerful production network

With two factories in Austria (Wels and St. Aegyd) and two in Italy (Gardone and Trieste), we have a strong production network ensuring highest production capacity as well as short delivery times. Moreover, our Trieste factory offers direct accessibility to the sea for quick and efficient transportation.

Large dimensions? No problem.

For demanding ropeway installations, we produce ropes with diameters of up to 70 mm and a weight of up to 140 tons.

Full service from A to Z

We do not only take charge of production, but support our customers throughout the entire project, from the design phase through to implementation. After production, we also attend to the installation, including rope hoisting and rope splicing procedures, as well as the final inspection. We also ensure trouble-free transportation and logistics for delivery in due time.

Diameter up to

70

mm

Single rope weight up to

140

tons

Partner for long-term success

Our service does not end with delivery. We assist our customers with comprehensive after-sales support. This includes the inspection of damaged ropes or ropes that were used for a long period of time by our damage appraisers and rope analysts. Our international service team is always ready to provide support on site and ensure the long-term reliability and safety of ropeway systems.

Innovation & digitalization for the future

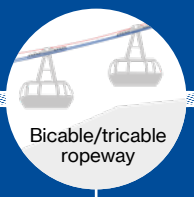
We constantly expand our portfolio, push innovations, and count on digitalization to help shape the ropeway technology of the future.

Rely on a partner who combines quality, service, and innovation to deliver safe and future-proof ropeway solutions.

Solutions that fit your needs

Our portfolio comprises high-performance steel wire ropes for every application: innovative, reliable, and forward-looking. With state-of-the-art manufacturing processes, large diameters, and comprehensive service, we offer tailor-made solutions for any challenge.

Applications



Eisgratbahn ropeway, Austria

Teufelberger-Redaelli is proud of having been involved in the construction of the 3S Eisgratbahn ropeway on the Stubai Glacier. In the fall of 2015, we delivered the first four Stressless track ropes, followed by four more track ropes and two Solitec® haul ropes in the spring of 2016. Since October 2016, the ropeway has transported up to 3,014 passengers per hour, thus testifying to the quality and performance of our rope solutions.

Vigiljoch, Italy

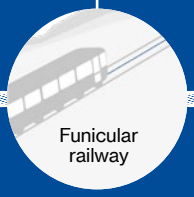
August 2023 saw the inauguration of the new ropeway connecting Lana even more efficiently with Monte San Vigilio. For this project, Teufelberger-Redaelli delivered two load-bearing ropes of the type Stressless per line, with a diameter of 44 millimeters and a breaking strength of 114 tons. The modern facility has doubled the capacity and improved stability in windy conditions while preserving the historic valley and mountain stations. Once again, the close cooperation with Doppelmayr Italia has proved successful, providing another example of our well-tried rope solutions for challenging ropeway projects.

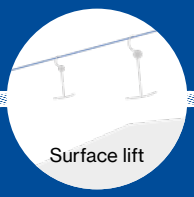
Mandalay Bay Casino, USA (Las Vegas)

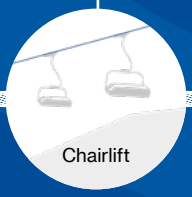
Since 1999, the Cable Liner at the Mandalay Bay Casino in Las Vegas has transported up to 65,000 people a day, operating reliably 12 hours every day. Driven by a Teufelberger-Redaelli Solitec® haul rope with a length of 1,800 meters and a diameter of 33 millimeters, the ropeway of 865 meters in length has already completed 60,000 operating hours and more than one million bending cycles, thus providing impressive evidence of the longevity and quality of our rope solutions.

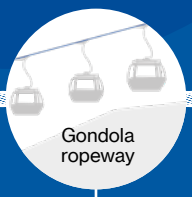
DeMoisy, USA

In December 2023, the DeMoisy Express in Snowbasin went into service offering the guests new slopes and additional lift capacities. For this modern chairlift, which takes people up the mountain at high speed, Teufelberger-Redaelli supplied a Redmont Dual Core hoist rope with a length of 4,900 meters, a diameter of 45 millimeters and a weight of 35.4 tons. With improved wind protection measures, comfortable seats, a shorter riding time, and, last but not least, our reliable rope technology, the system sets new standards in the skiing area.



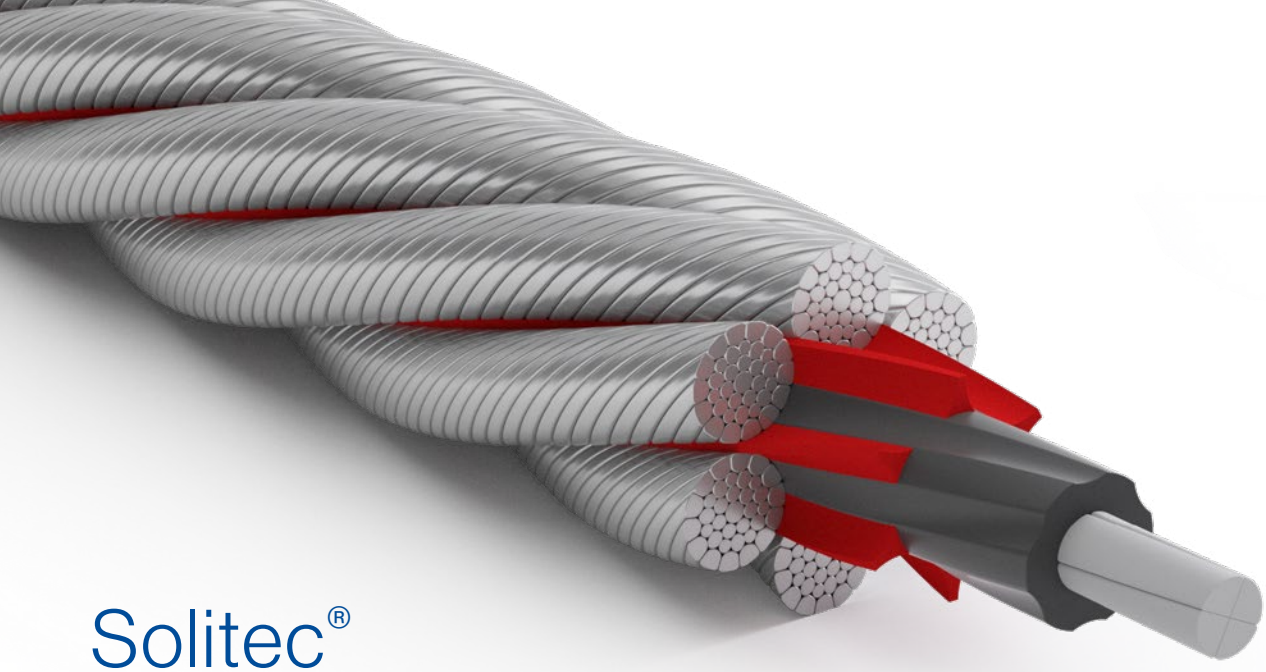






Pointe de la Masse, France

In Les Trois Vallées, the skiing season 2021/22 started with the inauguration of the new 10-passenger gondola ropeway “Pointe de la Masse”, the first LEITNER ropeway in France to run at a speed of seven meters per second. With our Solitec® 6xK41WS haul rope with a length of 6,800 meters and a rope diameter of 60 millimeters, we have made an essential contribution to this impressive project.



Solitec®

Solitec® ropes offer a multitude of advantages. The preformed support profiles between the strands ensure a perfectly uniform rope geometry and consistent rope properties throughout the entire life cycle. The movable support profiles prevent stress peaks in the core when the rope runs around bullwheels, and discourage fretting corrosion due to the defined spacing of the strands.

Solitec® ropes are used as hoist ropes in unidirectional monocable ropeways and as haul ropes in unidirectional multicable ropeways, reversible aerial ropeways, and funicular railways.

Specifications

- Durable plastic compound core
- Compacted & uncompacted
- Bright & galvanized
- Versions: 6-, 7-, 8-strand
- Customized strand design

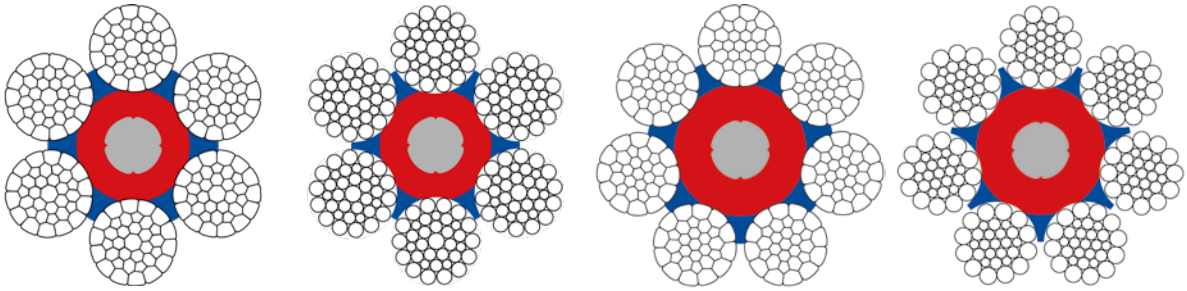
✓ SUPERFILL®

Advantages

- ✓ Uniform spacing of the strands
- ✓ High dimensional stability under high lateral pressures
- ✓ Perfectly round rope geometry
- ✓ Robust multi-component plastic core
- ✓ Permanently lubricated fiber core without loss of lubricant
- ✓ Very long service life
- ✓ Very low elongation during operation
- ✓ Little vibration and low noise level
- ✓ Little vibration due to perfect and uniform rope geometry
- ✓ Stable clamping characteristics for ropeway vehicles

Solitec® Max7 Additional Advantages

- ✓ Significantly improved comfort due to the reduction of vibrations: very smooth running behavior, less noticeable operating noises
- ✓ Longer service life: better bending fatigue strength due to smaller strands, reduced load and wear in splice areas, better load distribution at cleats, grippers, and pulleys
- ✓ Very good field experience with more than 160 ropes sold



Solitec® compacted | Solitec® non-compacted | Solitec® Max7 compacted | Solitec® Max7 non-compacted

Solitec® 6xK36WS

Kotor, Montenegro

The UNESCO World Heritage City of Kotor is connected to the holiday village of Kuk on the Lovćen mountain via a gondola ropeway of 3.9 km in length. Providing the only direct connection from the sea to a mountain in Europe, this ropeway can transport 1,000 passengers per hour in less than 11 minutes.

Product: Solitec® 6xK36WS,
Length 8,200 m,
Diameter 58 mm,
Total weight 110 t

Customer: LEITNER AG

“

As the CEO of the Kotor ropeway, I opted for Teufelberger-Redaelli as our partner since they bring extraordinary expertise, comprehensive industry knowledge, and precision technology to the table. Considering the complexity of our terrain, choosing a partner with a proven track record was of paramount importance. The commitment of Teufelberger-Redaelli to quality and innovation corresponds perfectly with our vision and makes Teufelberger-Redaelli the ideal choice for this remarkable endeavor.”

Marco Cus, CEO

Redmont Dual Core

The Redmont Dual Core features an elastic core structured in two layers and is thus a true allrounder. Thanks to the plastic embedding of the strands, this rope offers increased uniformity and diametral stability.

It is used as hoist rope in unidirectional monocable ropeways and as haul rope in unidirectional multicable ropeways, reversible aerial ropeways, and funicular railways.

Specifications

- Durable plastic compound core
- Compacted & uncompacted
- Bright & galvanized
- Versions: 6-, 7-, 8-strand
- Customized strand design

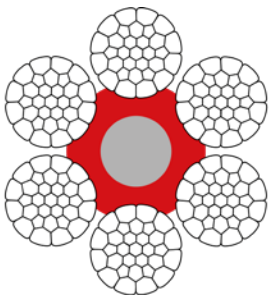
✓ SUPERFILL®

Advantages

✓ Long service life

✓ Little vibration due to perfect and uniform rope geometry

✓ Stable clamping characteristics for ropeway vehicles



Redmont Dual Core
compacted

Redmont Dual Core
non-compacted

Schnalstal Glacier Cable Car, Austria

The Schnalstal Glacier Cable Car was opened back in 1975. An essential milestone in the touristic development of the valley, it provides the connection to the skiing area. With a length of 2,150 m, it overcomes an altitude difference of 1,180 m in less than six minutes. The ropeway is one of the most impressive facilities of its kind in the Alps and offers breathtaking views of the scenery and the peaks.

Rescue rope: Redmont Dual Core 619,
Length 4,600 m,
Diameter 19 mm,
Total weight 6 t

Track rope: Stressless,
Diameter 54 mm,
Length 4 x 2,600 m,
Total weight 176 t

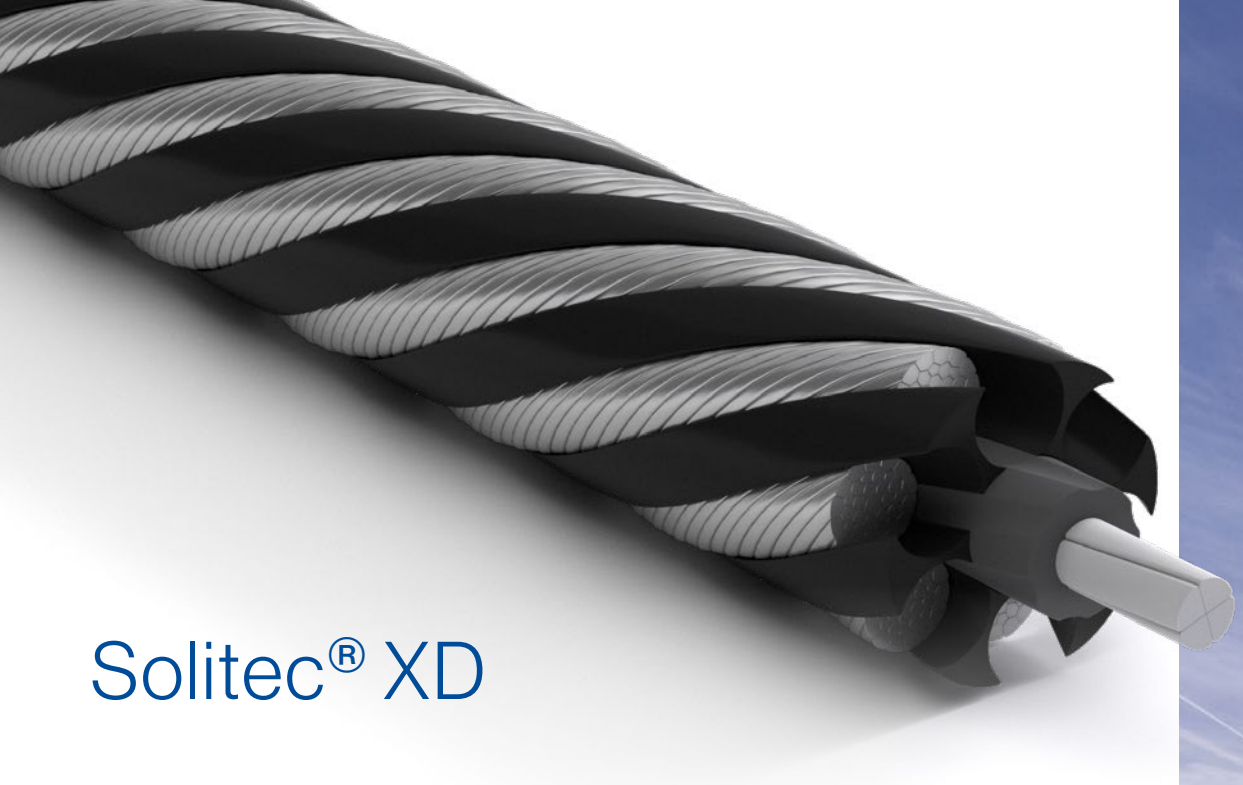
Customer: Doppelmayr Italia SRL

“The main challenge for the construction teams and material suppliers such as Teufelberger-Redaelli was meeting the tight schedule and working in mountain terrain in high altitudes (2,011 m - 3,212 m). We’d like to thank you for the outstanding work you did and the excellent material you provided.”

Lukas Tumler,
Head of Service

We are fit for future – Innovation happens now!

The future starts now – and we are ready! We have reached the next level and are setting new standards for urban ropeways. Our new rope ensures a smooth, noise-reduced, and comfortable ride. Combined with the smart tool of our strategic alliance, we drive digitalization and efficiency forward – offering you a full service package for your installation. Experience the perfect fusion of cutting-edge technology and high-quality wire rope. Because innovation starts today – and you will benefit from it tomorrow.



Solitec® XD

An advanced version of the proven Solitec® technology, the Solitec ® XD sets new standards in passenger transportation, both in alpine and in urban regions. Due to its noise-reduced and vibration-reduced characteristics, it ensures a particularly smooth and comfortable transport experience.

The optimized rope design with specially shaped support profiles filling the space between the strands creates a nearly round surface. This results in very smooth running behavior and less noise during operation. With its long service life and state-of-the-art technology, it is the perfect rope for the Next Generation in passenger traffic with Extended Durability (XD): ideal for use as hoist rope in unidirectional monocable ropeways and as haul rope in unidirectional multicable ropeways and funicular railways.

Specifications

- Durable plastic compound core
- Compacted
- Bright & galvanized
- 6-strand design
- Customized strand design

✓ SUPERFILL®

Advantages

- ✓ Perfect for new urban mobility solutions
- ✓ Longer service life
- ✓ Low-noise and low-vibration properties for maximum riding comfort
- ✓ Perfect running characteristics for smooth and steady transport
- ✓ Excellent stability of the geometric parameters due to the rope's innovative design
- ✓ Little elongation
- ✓ Optimized for larger dimensions and higher speeds

Valcigolera ropeway, Italy

The Valcigolera ropeway from LEITNER is an important innovation in this skiing area. In 10-passenger cars, it currently transports 900 people per hour, with an increase to 1,500 people being scheduled. The ropeway connects Malga Valcigolera with Cima Tognola at 2,383 meters, overcoming the altitude difference of 465 meters in only three and a half minutes instead of the 12 minutes of the old chairlift. The highlight is the low-noise, cutting-edge rope which increases passenger comfort during the ride.

The new ropeway is part of a comprehensive modernization of the skiing area which includes the exchange of ski lifts, the construction of snow tracks, and the improvement of snow-making facilities.

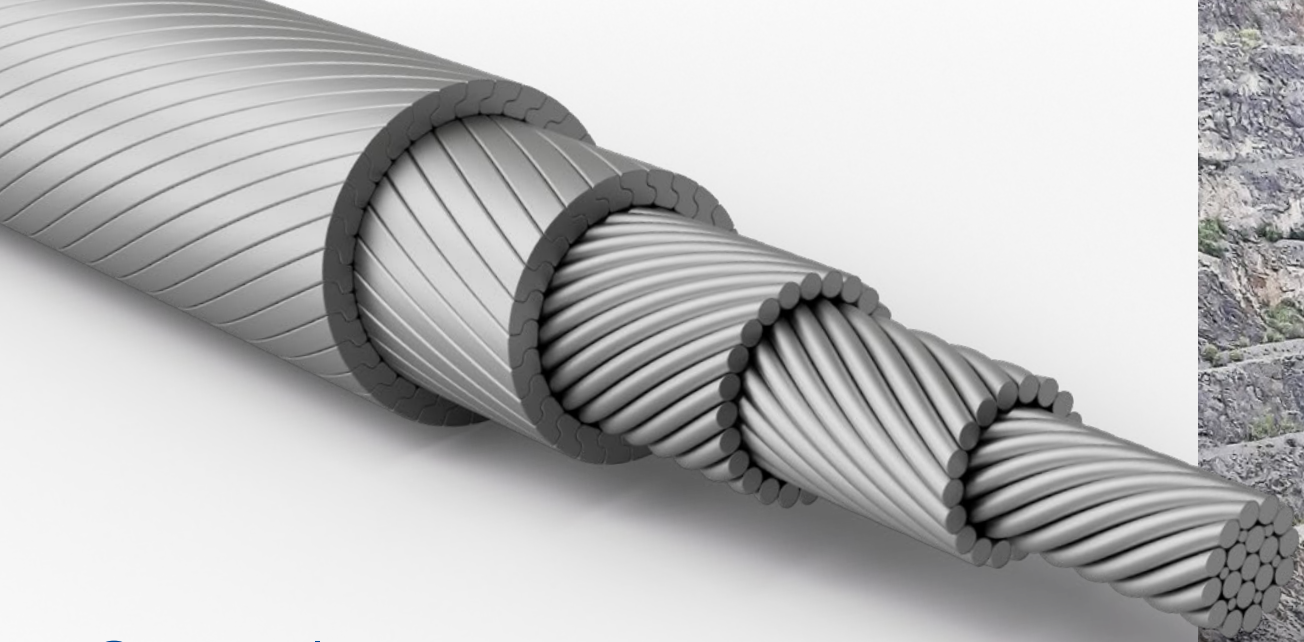
Product: Solitec® XD 6xK36WS,
Diameter 48 mm,
Length 2,786 m,
Total weight 25 t

Customer: LEITNER AG

“

Our guests truly appreciate the comfort of the ride. The Solitec XD has more than met our expectations. Compared to previous ropes, this one has completely exceeded our requirements, especially in terms of rope elongation. We are impressed by the performance of this innovation in operation!”

Giacobbe Zortea,
President – San Martino Rolle SpA



Stressless

for material ropeways

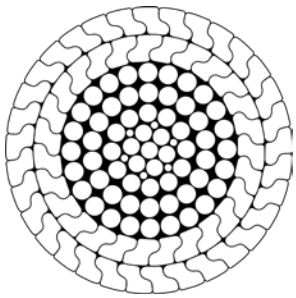
The full-locked coil track ropes for material transport offer a durable rope construction for heavy-duty applications. They are used in various ropeway systems for material transportation tasks such as RopeCon® and cable cranes.

Specifications

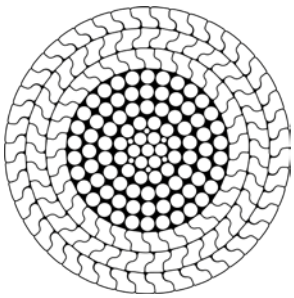
- Single-layer or multi-layer
- Construction designed for material transport
- Bright & galvanized, heavily galvanized possible

Advantages

- ✓ Wear-optimized design
- ✓ Rope hoisting is possible without a toggle, thanks to the low-twist construction
- ✓ Improved corrosion resistance due to heavily galvanized profiled wires



Stressless
2Z



Stressless
3Z

Bardon Hill, Great Britain

The RopeCon® system in Bardon Hill transports excavation material, emitting less CO_2 than if the material was transported by truck or by means of a conventional conveyor belt system installed on the ground. In the Bardon Hill quarry, RopeCon® combines ropeway technology with materials handling technology, spanning the quarry hollow over a length of 850 m with track ropes on which the belt conveying the material is moved. Regular retightening of the track ropes raises the system and helps control the drop height. Dust and noise emissions are minimized.

Being the first system of its kind in Great Britain, the RopeCon® in Bardon Hill conveys up to 1,000 tons of material per hour.

Haul rope: Redmont 619 SFC, galvanized, diameter 20 mm, total weight 2 t

Track ropes: Stressless 2Z, galvanized, diameter 42 mm, total weight 59 t

Customer: Doppelmayr Transport Technology GmbH

“Our cooperative partnership with Teufelberger-Redaelli is characterized by trust, transparency, and professionalism. What we appreciate most is the reliability and commitment of the team who are always responsive to our individual demands.”

Bernd Lampert,
Purchasing manager
Doppelmayr Transport
Technology GmbH

Stressless Data

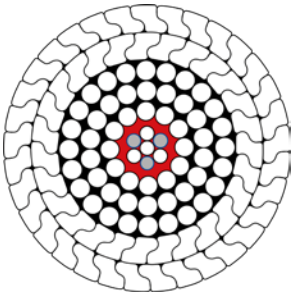
Our Stressless Data is the track rope with integrated optical waveguide or electric conductor for reversible aerial ropeways or unidirectional multicable ropeways. The innovative design and state-of-the-art production processes ensure highest stability and maximum rotation resistance. The full-locked coil track ropes serve as “rails in the air” on which passengers seem to float. The integrated data line provides for maximum data security, reduced investment costs, and maintenance-free operation.

Specifications

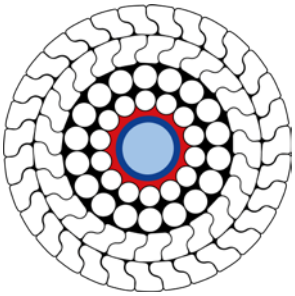
- Single-layer or multi-layer
- Design customized to application
- Bright & galvanized
- With or without data line as well as electric conductor

Advantages

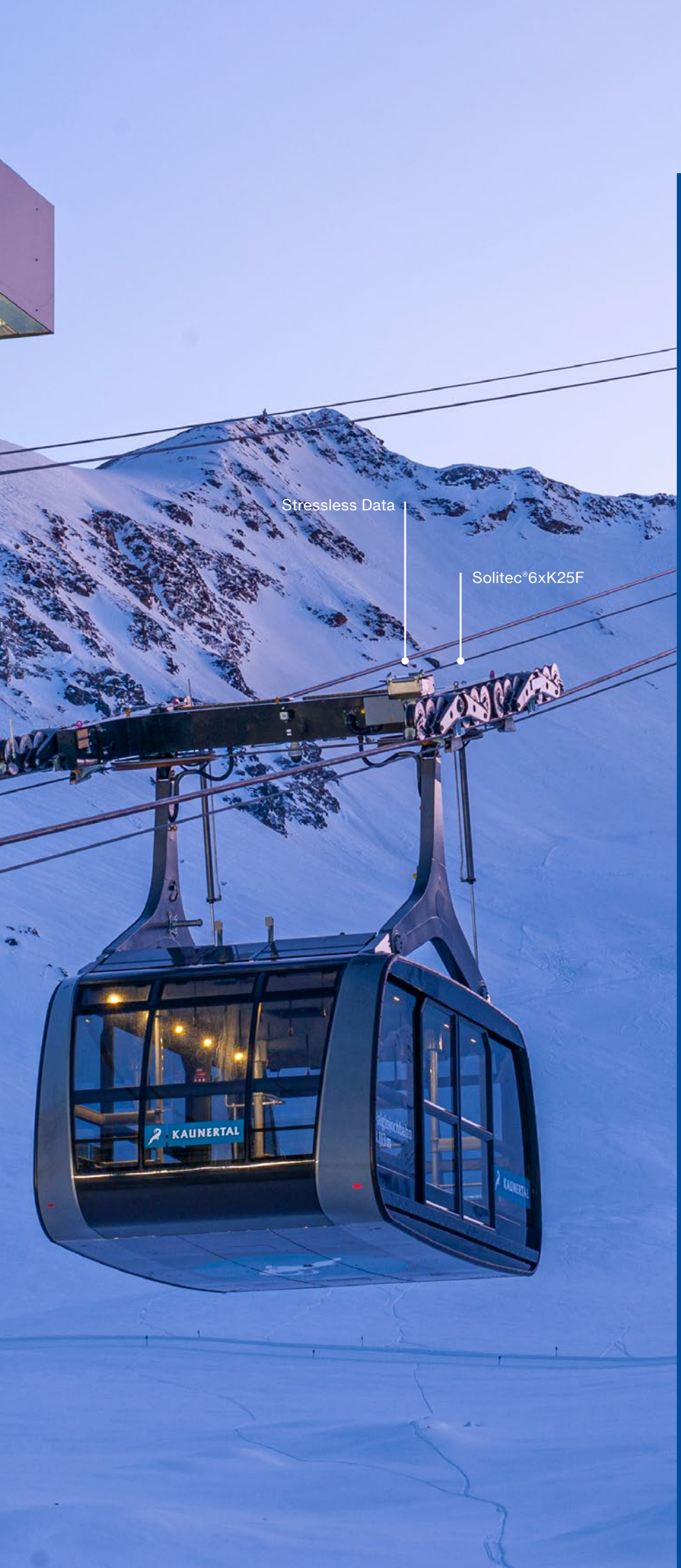
- ✓ Rope hoisting is possible without a toggle, thanks to the low-twist construction
- ✓ The centrally embedded optical waveguide and/or electric conductor ensures:
  - Ease of installation
  - Reduced mechanical load
  - Consistent properties throughout the entire service life
  - Prevention of external damage
- ✓ Optimized design for reduced weight difference with or without optical waveguide (deviation <1 %)



Stressless Data
optical waveguide



Stressless Data
electric conductor



Falginjoch ropeway, Austria

Thanks to a wide gauge, a special rope guidance configuration, and the Funifor carriage, the Falginjoch ropeway is extremely wind-stable. Only two towers are needed along the entire route of 2,000 m. The upper terminal is supplied with energy via the Stressless Data track rope with electric conductor and optical waveguide, which makes excavation work unnecessary. Traveling at speeds of up to 12 meters per second, 100 passengers per car reach the Falginjoch at 3,113 meters within less than four minutes.

Haul rope: Solitec®6xK25F,
diameter 27 mm,
total weight: 24.5 t

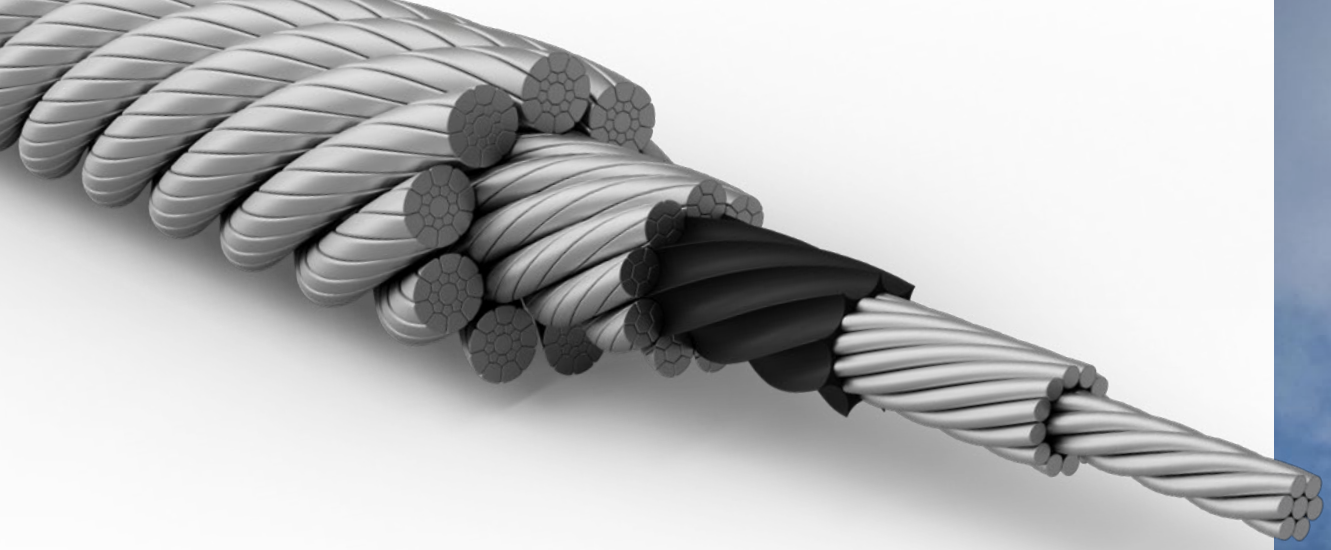
Track rope: Stressless Data
with electric conductor
and optical waveguide
diameter 64 mm
total weight: 104.5 t

Customer: Doppelmayr Seilbahnen GmbH

“

An innovative solution was needed: The power supply to the upper terminal was implemented via a copper conductor, and image and data transmission is ensured via an optical waveguide. Both the conductor and the waveguide are integrated in the track rope, which made time-consuming excavation work along the route unnecessary. Teufelberger-Redaelli convinced us with their technical know-how, many years of experience, and innovative solutions. The cooperation was professional and dependable. Teufelberger-Redaelli is a partner you can rely on.”

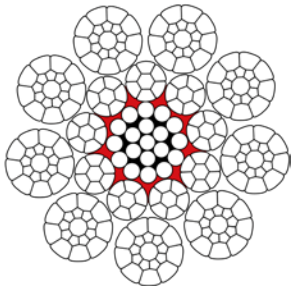
Ing. Franz Wackernell,
Management of Kaunertaler
Gletscherbahnen GmbH



Partnership of decades:

Exclusive slope winch ropes

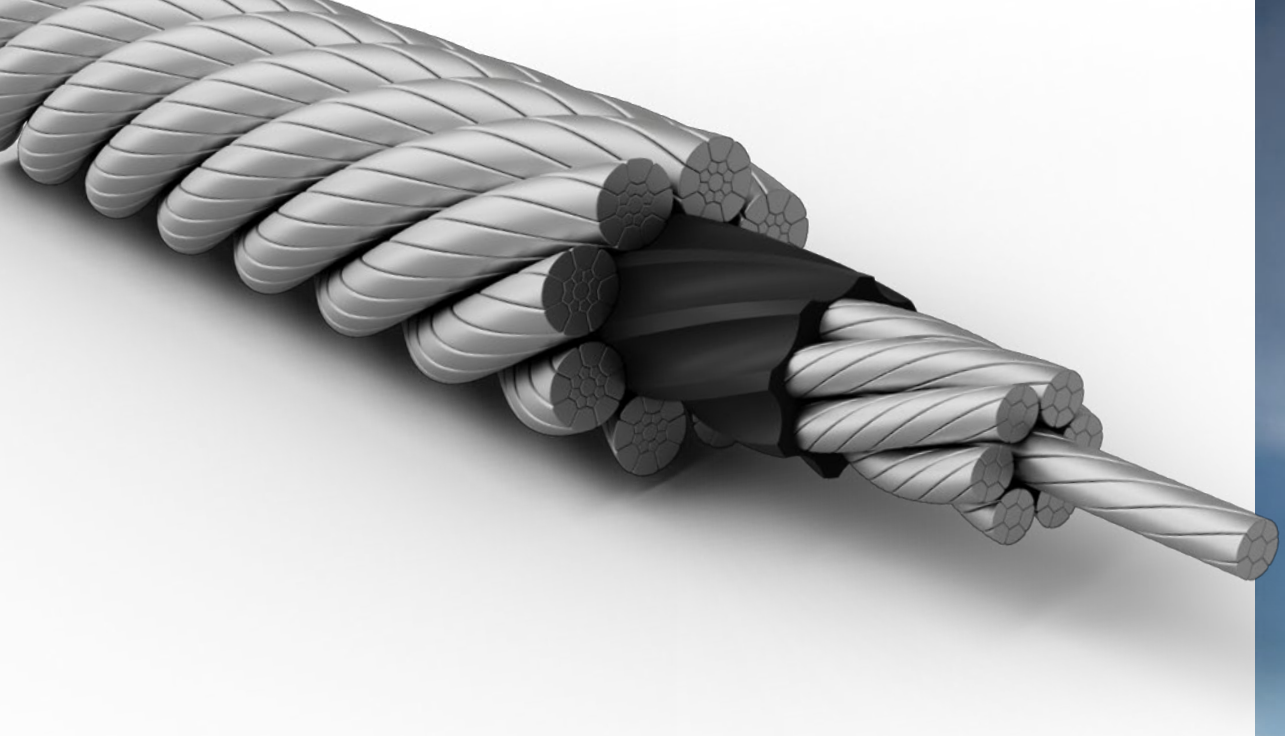
Since 2008, Teufelberger-Redaelli has been the exclusive supplier of specially developed winch ropes for snow groomers to Prinoth, and since 2013 also to Kässbohrer — the leading manufacturers of snow grooming machines. Our ropes feature an extraordinary service life, excellent spooling characteristics, as well as an impressive breaking strength and have come to be recognized as a benchmark for quality and performance in the market.



BS 909SQ

For the best service and highest quality in slope winch ropes, please contact our partner **Kässbohrer** directly.

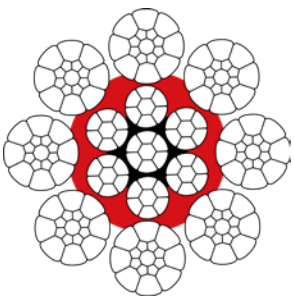
KÄSSBOHRER GELÄNDEFAHRZEUG AG



The long service life of our slope winch ropes maximizes periods of use and substantially reduces maintenance intervals, which results in a significant economic advantage for our customers. The specially designed plastic cover protects the ropes reliably from snow, ice, and external influences, which further increases their durability.

Our slope winch ropes are manufactured using a special compaction technology called SUPERFILL® which ensures a particularly high breaking strength. The 8-strand or 9-strand design of the ropes provides for optimum flexural fatigue characteristics making the ropes ideal for use in winch systems such as drums or spill winches.

Due to our close partnership with Kässbohrer and Prinoth with their extensive networks of service partners all over the world, we offer not only top-quality products but also quick and competent service on site. This guarantees high reliability and efficiency in the operation of winch-equipped vehicles, thus adding to long-term cost-effectiveness.



QS 808S

For the best service and highest quality in slope winch ropes, please contact our partner **Prinoth** directly.

Pure thrill high up in the sky:

unforgettable zip line experiences with our ropes!

The Hanazono Zipflight is one of the longest zip lines in the world and offers an exceptional flight experience above the breathtaking Hokkaido landscape. With a total distance of 2,591 meters, the zip line not only ensures a special thrill but also provides a spectacular view of the Yotei-zan volcano and the beauty of the surrounding nature. Two zip lines arranged side by side allow enjoying the adventure together with friends or family.

For this impressive project, Teufelberger-Redaelli has supplied a “Pack 6xK36WS-IWRC galvanized” track rope whose excellent quality and load capacity ensure a safe and smooth operation. Our ropes have been developed specifically for such demanding applications and guarantee high performance and longevity.

The track rope used ensures the required stability and safety of the zip line. With total lengths of two times 450 meters, two times 4,902 meters, and two times 1,750 meters, the zip lines cover impressive distances and guarantee an exciting experience for everyone who dares to give them a try. The rope diameter of 22.22 millimeters ensures the necessary load capacity to cope with the extreme demands and bending cycles.

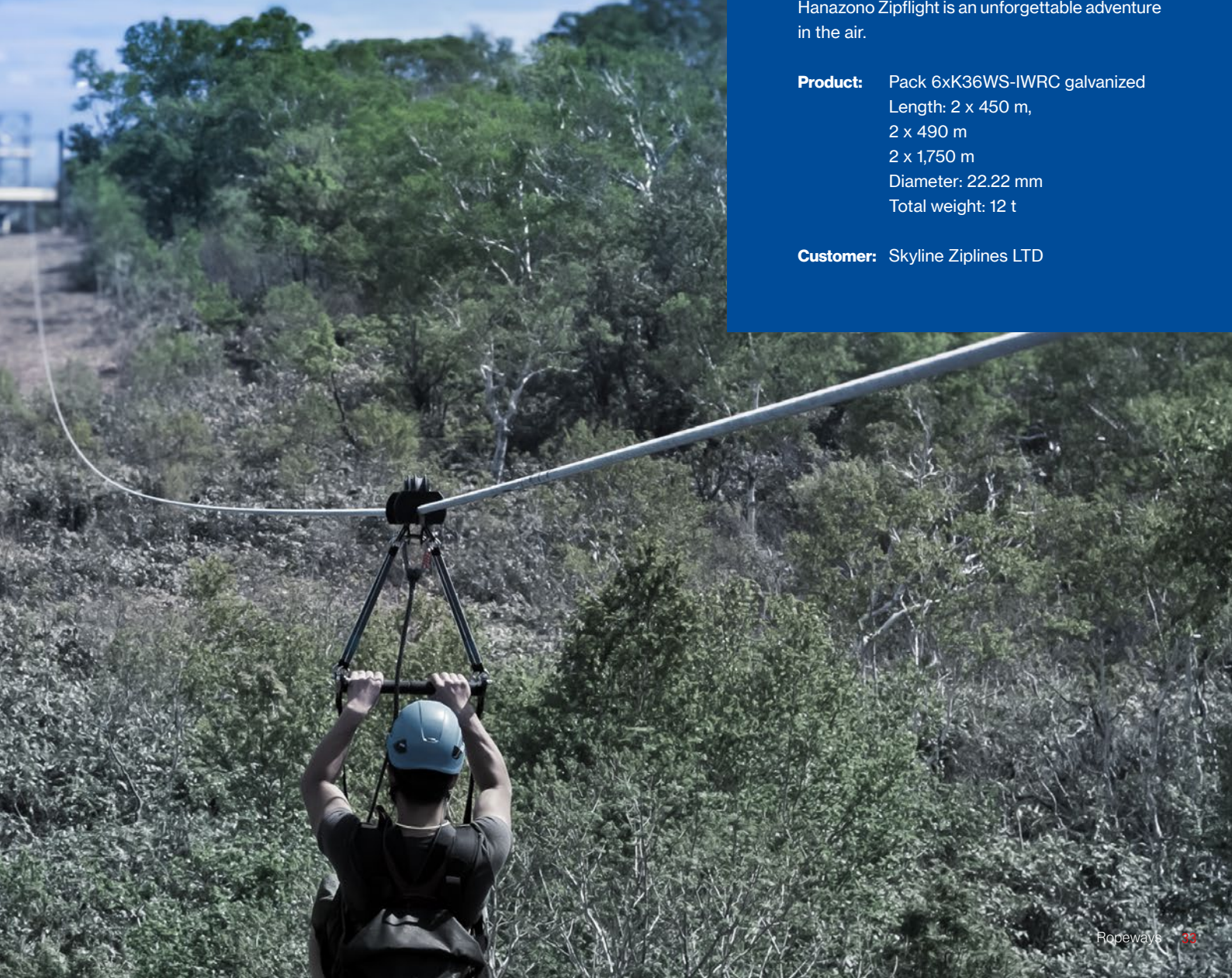
Due to our high-grade rope technology, the Hanazono Zipflight becomes an unforgettable experience in the air.

Hanazono Niseko ski resort / Hokkaido, Japan

Thanks to our high-quality rope technology, the Hanazono Zipflight is an unforgettable adventure in the air.

Product: Pack 6xK36WS-IWRC galvanized
Length: 2 x 450 m,
2 x 490 m
2 x 1,750 m
Diameter: 22.22 mm
Total weight: 12 t

Customer: Skyline Ziplines LTD



Above the rooftops of Vienna

Up high with our ropes!

The Vienna Giant Ferris Wheel is one of Austria's most famous landmarks and offers an incomparable view over the city. As a technical cultural asset, it combines history with modern engineering. State-of-the-art rope technology is used to ensure that this impressive landmark also meets the highest technical standards.

Our ropes are not only manufactured, but also professionally spliced and assembled on site - for maximum safety, stability and durability in daily operation. With precision and decades of experience, we support the maintenance and safe operation of this iconic structure. This means that the Vienna Giant Ferris Wheel will remain a place of unforgettable views and special moments in the future - thanks to rope technology at the highest level.

The Vienna Giant Ferris Wheel, Austria

Teufelberger-Redaelli supplied high-quality spoke and drive ropes for this important project, which were specially developed for the demanding requirements of a Ferris wheel.

Drive ropes: 2 x Solitec 6x31S,
Diameter: 24 mm,
Length: 2 x 450 m,
Total weight: 1.7 t

Spoke ropes: Round strand rope 7x7,
Diameter: 32 mm,
Length: 27 m,
Weight: 110 kg

For exciting insights into our service work on the Vienna Giant Ferris Wheel - simply scan the QR code.

We care for your installation

Full range of services

From the quotation phase through to a condition analysis: we from Teufelberger-Redaelli provide a full range of services. We combine our long years of experience in high-performance rope production with state-of-the-art analysis methods and are continuously pushing limits in rope technology. In the process, we ensure highest quality, in terms of our products as well as in terms of our services, from the moment we receive an order to rope production and aftersales. We care for your installation: As we live up to this principle, our customers benefit directly from efficiency, service, and quality advantages.

Development

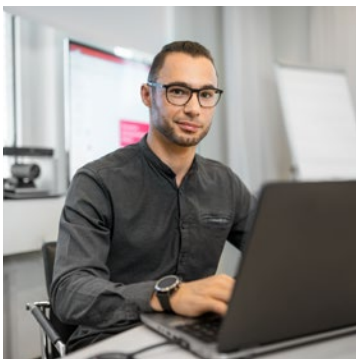
Iterative development of highly efficient rope solutions

Project planning & simulation

Definition of optimum rope design and precise rope dimensioning based on the Analytical Rope Model; customized proposal

Rope manufacture & digital production control

Production of the high-performance steel wire rope incl. continuous monitoring of geometric properties



Development

We are constantly advancing our ropes portfolio. We are close to the market and respond with our products to market needs. Whether for the alpine or the urban sector, we from Teufelberger-Redaelli focus on highly efficient rope solutions. At our site in St. Aegyd, we have an in-house ropeway for test purposes which allows an iterative development process and shortens the development phase. Additionally, we are represented in standards committees and actively involved in the shaping of the future of rope technology.

✓ **Results from rope analyses**

Our Apptech (application engineering) team cooperates closely with our customers, providing competent advice. MRT analyses, data from R&V (rotation and vibration) sensors and measurements by means of a portable GLD (Geometric LED Detector), as well as analyses with high-speed cameras provide insights into the condition of a damaged rope or a rope that has been in use for a long time. Moreover, they provide data about the interaction between the rope and the system at interfaces. These important and detailed insights are fed back to the rope development team for continuous product improvement based on REX (return on experience).

Project planning & simulation

Based on an accurate rope design and precise rope dimensioning, we provide the optimum solution for each application and prepare tailor-made and customized proposals.

✓ **Precise rope dimensioning for new systems**

By means of the Analytical Rope Model, we define the optimum rope dimensioning and simulate the rope's characteristics: Based on the correct rope specification, the rope-specific straining forces, and the optimized strand design, we are able to achieve a stable rope geometry and a consistent elongation ratio, thus ensuring optimum running smoothness and a long service life in the respective application. All components are perfectly attuned to each other under tension and in motion. The precise rope design also provides our customers with planning certainty in terms of service life forecasts. This applies not only to products from our standard portfolio, but also to customized rope solutions.

Transport & logistics

Construction site visits and definition of transport route incl. selection of a qualified forwarder

Installation

Full-service installation incl. rope hoisting in combination with system-specific tensioning work performed by skilled in-house personnel

Rope check before commissioning

Measurements performed at the splice areas incl. splicing log

Service & support for operation, maintenance, and repair

Rope condition analyses, splicing

Simply scan the QR code for more insights into our production!

Rope manufacture & production control

For the production of high-performance ropes, we rely on high-grade materials and state-of-the-art production technologies. With our comprehensive expertise in strand compaction, we increase the breaking strength of small rope diameters, and our long-standing experience with socketing ensures powerful connections.

- ✓ **Efficient production network**

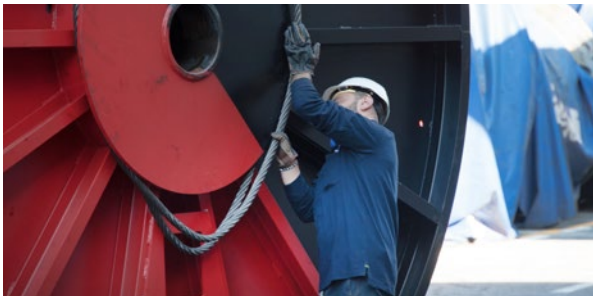
  With two factories, each, in Austria and Italy, we have a high-performance production network. The modernization of the Trieste plant allows us to produce ropes with a diameter of up to 70 mm and a weight of up to 140 tons. Due to the Trieste location's direct access to the sea, we are able to deliver ropes quickly and around the globe.

- ✓ **Comprehensive testing**

  Teufelberger-Redaelli performs a broad range of tests: tensile tests on strands, continuous bending tests, rotating bending tests, and many more. In combination with the CE certification of our products, these tests ensure premium quality on a long-term basis. For this purpose, we rely on an excellent network and cooperate with renowned testing organizations and institutions all over the world. Read more about this on page 40.

- ✓ **Digital production control**

  During production, rope diameter, lay length, waviness, and ovality are measured digitally, serially, permanently, and over the whole rope length using the patented and stationary GLD (Geometric LED Detector).



Heavy transportation of steel wire ropes.

Transport & logistics

Before installation, our service team inspects the construction site. This also serves the purpose of defining the ideal transport route enabling safe delivery even in difficult weather conditions.

- ✓ **Optimized transport logistics**

  We have a lot of experience in transporting reels weighing several tons, and no mountain, no matter how steep, prevents us from getting them to their destination. Upon request, we also take care of the "last mile" and take the rope to the terminal station on the mountain. For the heavy haulage of ropes for ropeways, we define the best transport route and select only qualified and proven haulage partners.


Our splicing team during installation.

Installation

Highly complex installation processes, i.e. system-specific tensioning, hot and cold socketing in the field or in production, and high-accuracy rope splicing: Our fitters perform approximately 600 installation jobs all over the world every year, and our certified splicers apply the most durable splicing methods, thus exceeding standard requirements.

- **Rope hoisting**

  In Austria and Central Europe, reliable and proven partners of Teufelberger-Redaelli take care of the tricky task of rope hoisting. These specialist companies have the necessary expertise and equipment to make a professional job out of rope hoisting. In other places, we prepare rope hoisting, coordinate the tasks of the various craftsmen involved and provide support through supervision and a precise rope analysis during rope hoisting.

- **Rope installation / splicing**

  The highly complex installation process is performed by Teufelberger-Redaelli's qualified fitters. We operate on a world-wide basis with two well-trained splicing teams. Thus, we guarantee short response times and are able to accept short-notice deployments. During installation, the rope geometry is monitored continuously.

Rope check before commissioning

After splicing and before commissioning, all work is checked and the results are recorded digitally for documentation purposes.

- **Final inspection**

  During final inspection after rope installation, we measure the splice area and transfer the data into the digital splicing log which is sent to the customer.

Service & support for operation, maintenance, and repair

Relying on digital precision instruments and modern technologies, our Apptech team keeps a close eye on the condition of a rope during ropeway operation.

- **Patented rope check**

  By means of the portable GLD (Geometric LED Detector) developed by Teufelberger-Redaelli, we analyze the rope geometry over the whole rope length on site. The R&V sensor, also developed in-house, measures rotation and vibration of the complete rope to detect the cause of vibrations. Read more about the GLD and the R&V sensor on pages 42 and 43.

- **Visualization of vibration analysis**

  High-speed cameras detect vibrations of structures and any loose or elastic behavior of ropeway components. By identifying worn mechanical parts or cracks in system components or a misalignment of the tower, system failures and costly maintenance can be avoided. Thus, maintenance intervals can be optimized, and sources of noise pollution can be eliminated.

- **Maintenance & repair**

  Our analyses, including even forensic rope and system analyses as well as rope examination in the laboratory, provide information about the condition of a damaged rope or a rope that has been in use for a long time. Thus, the most suitable measures can be planned ahead and performed. Depending on the system type and the intended measure, our team will take care of the task at hand, such as tensioning, splice repair, rope shortening, greasing with special tools, or renewing the splice including digital splice data recording.

- **Next-level monitoring through AI**

  An AI-based monitoring tool allows the real-time analysis and monitoring of ropes, regardless of place and time. The all-in-one device combines MRT, GLD, and visual defect detection, with AI models identifying anomalies of the rope or defects and corrosion at an early stage so that necessary maintenance work can be performed in a timely manner. This yields enormous advantages for the operating companies: increased system availability, reduced downtimes, and efficient maintenance intervals. Read more about this on pages 44 and 45.

Precise and comprehensive rope testing

Teufelberger-Redaelli has made the quality of its ropes a top priority: We are constantly working on innovations and improving the properties of our ropes. Before a new rope is put into service, it is tested thoroughly.

Big Twister: tensile test

The “Big Twister”, which is equipped with a rotary swivel, measures the torque and the rotational behavior of a rope. This tensile test is mainly applied to hoist ropes, but for some years now, hauling ropes, too, have been subjected to a rotation analysis at the “Big Twister”. In this test, we establish the relationship between induced rotation and geometric changes in a rope which is then taken as a reference for the rotational analysis performed in the field by means of the R&V sensor.

Ropeway test rig

At the St. Aegyd location’s in-house ropeway, the operation of a hoist rope can be simulated for test purposes under almost real conditions. The test rig consists of a traction sheave, a deflection sheave (and tensioning sheave) and a central tower, thus offering several testing options over a length of 210 m of endless rope.

Splicing test

In the splicing test, various splicing materials, different design parameters and splicing methods are tested. Moreover, our splicers are trained at the test facility.

Endurance test

The testing of test ropes at the in-house ropeway provides important information about the performance of our ropes. It allows us to also draw conclusions about the expected service life of a rope. Moreover, test findings are incorporated in improvement measures for existing ropes and rope developments.

Other tests

Our patented in-house developments for monitoring, such as the R&V sensor and the GLD, were also tested at the ropeway test rig during their development. Their analysis results can be used for the direct advancement of our service portfolio. Additionally, performance tests can also examine the behavior of individual rope parameters.

Patented monitoring

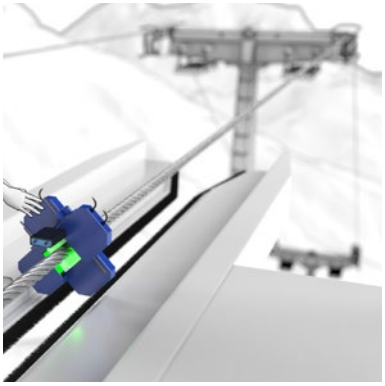
GLD – Geometric LED Detection

Permanent monitoring of the rope's geometry

The system developed and patented by Teufelberger-Redaelli is the first instrument worldwide for the continuous monitoring of the geometry of a rope in motion.

Stationary and portable

On the one hand, the GLD, as a stationary monitoring tool in rope production, provides pivotal information about a rope's diameter, lay length, ovality, and waviness over its entire length, thus ensuring a high level of quality. On the other hand, these exact data are also valuable during operation, e.g., for predictive maintenance or for damage analysis. Therefore, the GLD can also be used as a light-weight portable device in the field.

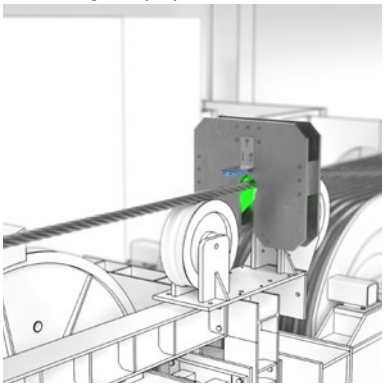


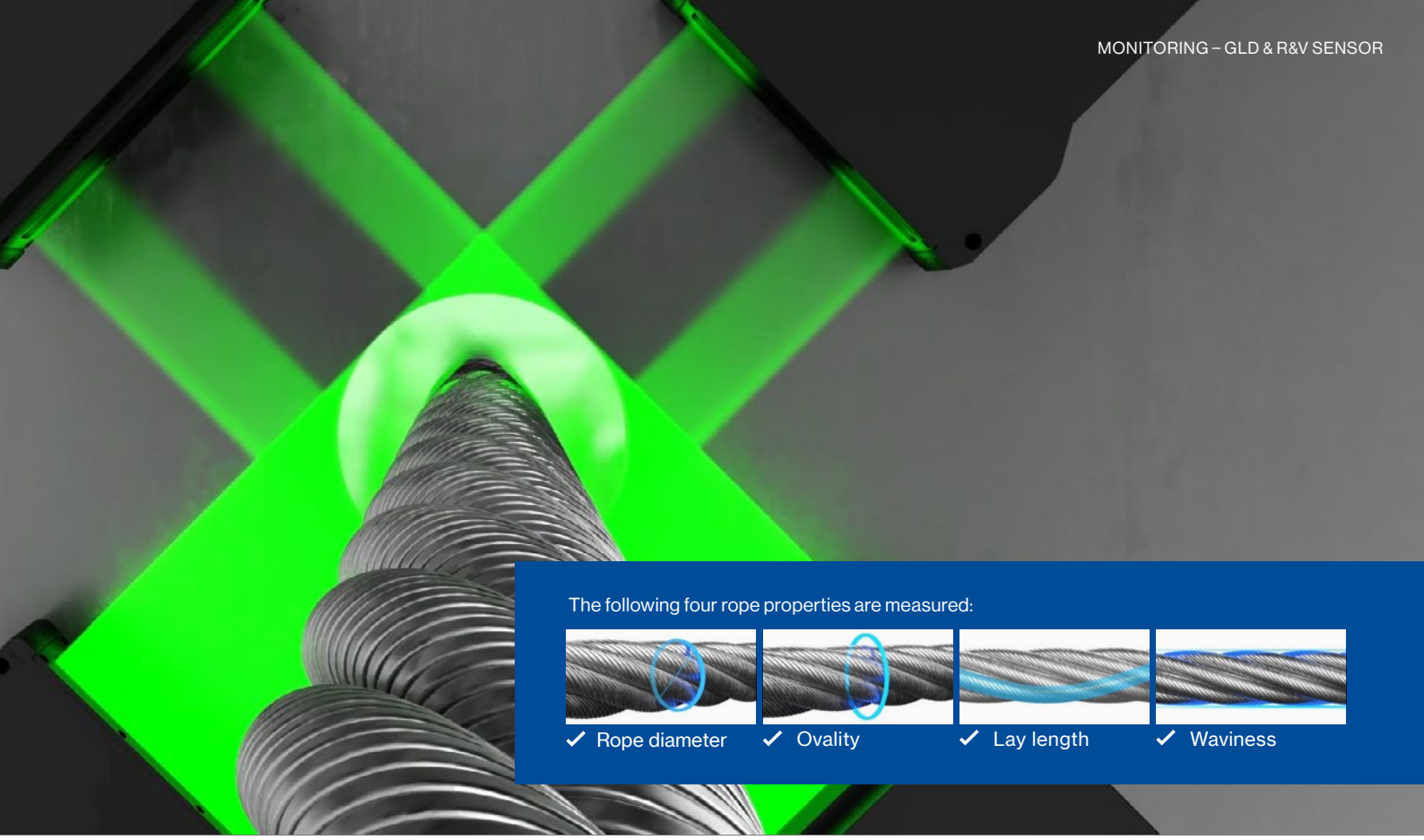
Monitoring in the field.

Precise geometric rope measurements

During the development of the GLD technology, the focus was on three factors that bring tangible benefits to customers: ease of handling, ease of installation, and immediate interpretation of measurement results. Compared to conventional manual measurements, the GLD covers a larger area of the rope surface, thus providing a comprehensive image of the actual condition of the rope. The GLD features high-speed algorithms (up to 5 meters per second) complemented by a user-friendly interface. Thus, diagnostically conclusive data for geometric parameters are promptly available. Rope diameter, lay length, ovality, and waviness over the whole analyzed length can be read off the control panel in real time. Any measurements deviating from the predefined tolerances are displayed and can be visually checked at once. In case of the stationary application of this technology during the production process, direct interventions in the manufacturing process are possible if suggested by the measurements. Once a measurement is completed, all data can be stored in a report and exported.

Monitoring in rope production.

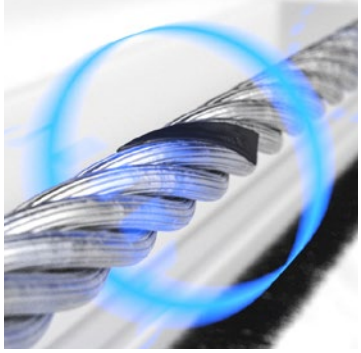




R&V sensor

Rotation and vibration monitoring directly at the rope

R&V sensor mounted on the rope strands.



A vibration-free rope is crucial for a comfortable and silent ropeway ride. The R&V sensor developed and patented by Teufelberger-Redaelli measures the rotation of the rope in motion around its central axis.

For new dimensioning and for ongoing monitoring

The R&V sensor can be mounted to the rope's strands as a compact component directly on site. It is used during the new installation of a system to measure any possible overtwisting of the rope. Additionally, the automated detailed vibration analysis also provides other valuable data: Lay length and waviness, too, can be calculated. Through one single click, the R&V sensor records the rotation and vibration of the rope over its entire length in real time. Thus, it delivers a map of the ropeway areas where specific local rope or system inspections are required. All results are transmitted directly and conveniently to the user's smartphone via Bluetooth. The R&V sensor is not only a diagnostic tool for our service team which can be used for requested inspections on site, but also a simple and reliable solution for our customers to facilitate the independent predictive maintenance of rope systems.

All-in-one monitoring: anytime, anywhere

The development team of Teufelberger-Redaelli is working on new and increasingly digital solutions that perfectly complement the product and service portfolio. At present, we are developing digital and future-fit instruments for rope inspection, cooperating closely with two strong partners in an expert alliance.

Alliance of three: rope-MRT-AI

With the cooperation of the rope specialists from Teufelberger-Redaelli, the AI pros from Raidyn, and the MRT experts from AMC Instruments, a new and strong alliance for the digital monitoring of high-performance ropes has come into being.

AIM Alliance for Intelligent Rope Monitoring

Strong partnership

RAIDYN

The company of Raidyn based in Leuven (Belgium) develops very accurate models and software solutions for technical applications by combining AI algorithms and application-specific calculation methods. For the AIM tool, they develop the algorithm and train the artificial intelligence for visual rope detection. The software detects discrepancies in lay length or diameter, wire breakage, and corrosion.

AMC INSTRUMENTS

AMC Instruments based in Settimo Torinese (Italy) supplies the carrier medium and develops magneto-inductive devices for the inspection of ropes and metal parts. The MRT solution is the carrier medium for the AIM tool and examines the interior of the rope.

Teufelberger · Redaelli

We from Teufelberger-Redaelli contribute to the alliance our expertise regarding market requirements as well as our comprehensive know-how of ropes. We develop and produce high-performance steel wire ropes and, through the alliance, create additional solutions increasing efficiency and safety in use.

As an alliance, we are working together on digital instruments for rope inspection, specifically on all-in-one real-time monitoring with images and videos, with a view to being able to monitor high-performance ropes efficiently and permanently.

All-in-one monitoring of high-performance ropes

The AI-based tool of the “Alliance for Intelligent Rope Monitoring (AIM)” combines MRT and GLD with AI technology to ensure an efficient and permanent inspection of high-performance ropes from Teufelberger-Redaelli.

The innovative joint development of the expert alliance offers completely new possibilities for a camera-based, visual condition monitoring of a rope in real time. By means of complex AI models, the AIM tool detects anomalies in the rope at an early stage. Moreover, via the user-friendly interface, all data are available in real time, anytime and anywhere, promptly, and clearly arranged. Any discrepancies in lay length or diameter, any wire breakage as well as corrosion or other damage can thus be detected quickly, and the necessary measures can be taken in a timely manner. This increases the availability of the system, reduces downtimes, and allows the operating company to perform predictive and thus efficient maintenance. Urban ropeway applications, in particular, will benefit considerably from real-time rope inspection in terms of system availability. Based on the TCO (total cost of ownership) approach, total cost over the complete period of use will be reduced since maintenance can be scheduled optimally, and other measures can be taken in time. With this full-service strategy, we accompany the rope throughout its whole service life, true to our motto: “We care for your installation”.

The advantages at a glance:

- ✓ Continuous real-time monitoring
- ✓ Simultaneous analysis of a rope’s interior and exterior
- ✓ 360-degree view of the rope condition with MRT and AI damage detection plus GLD
- ✓ Complete documentation
- ✓ Easy interpretation of data

200 years of record performance

The world‘s heaviest steel wire rope

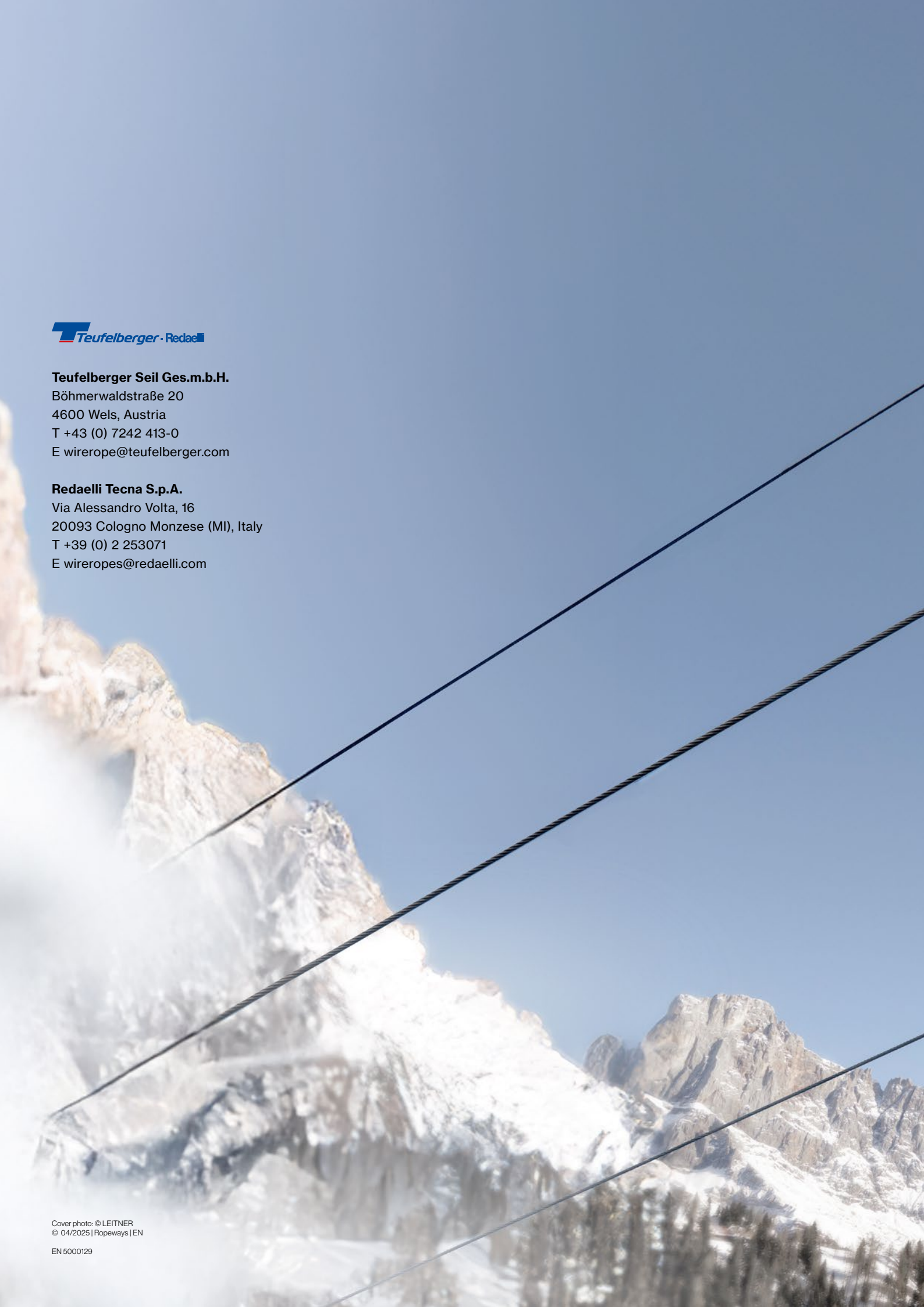
Records are made to be broken. Every year, with our quality, innovation and high-tech expertise, we reach and surpass thehighest benchmarks in the world. Even our own.

With more than 200 years experience as a wire rope manufacturer, Teufelberger-Redaelli is one of the leading hi-tech steel wire rope producers. The Trieste plant is capable of producing what are presently the biggest state of the art steel wire ropes in the world. The location of the plant at the dockside of the Trieste harbour allows the loading of huge reels without any preliminary land transport.

Since 2010 Teufelberger-Redaelli and the record-breaking Flexpack® rope have been awarded the world record in the engineering and technology area for the heaviest wire rope ever manufactured in the world - for the fifth time in a row!

Teufelberger-Redaelli breaks the World Records again in 2023 with Flexpack®. This rope has a diameter of 160 millimeters, a lengh of over 4,010.126 meters and weighs an impressive 495.9162 tons. It represents the most advanced steel rope technology innovation in the world today.


Teufelberger · Redaelli
WORLD'S HEAVIEST ROPE
Teufelberger Redaelli



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