At this year's SME meeting in Phoenix, Martin Engineering's R. T. Swinderman spoke of the Ten common mistakes in conveyor specification and design. The first he presented was not knowing your bulk material. "The science of bulk material handling has advanced to the point that the properties of the bulk solid should be determined for all but the smallest and least critical applications."

Next he talked of loading on the transition. "A common ‘trick of the trade’ to meet price targets is to reduce the overall length of a conveyor by loading on the transition of the belt from flat to troughed. Another approach to shortening the overall length of the conveyor to meet price targets is a design technique known as half trough transition. When the practices of loading on the transition and half trough transition are used in combination the result can be increased belt wear, increased chute wear and increased spillage."

Belt benefits

Truck transport is expensive and can negatively impact the environment. An economical alternative is a continuous conveyor, such as troughed or tubular belt conveyors. With the right design, these conveyors can be optimally adapted to the environment.

Beumer has executed a contract worth more than €5 million to design and install a 12.5-km-long conveying system in rough and mountainous terrain for Asia Cement Group.
The other eight mistakes he notes are:

- **Using minimum pulley diameters** – “Best practice is to select a pulley diameter that is at least 600 mm or one size larger than the minimum recommended by the belt manufacturer.

- **Lack of access** – the examples of lack of proper access in many conveyor designs are so numerous that a paper could be written just on this topic alone.

- **Covering key components with piping and conduit** – specify that conduit and piping runs not be allowed to block or impede access to critical components along the conveyor.

- **Insufficient edge sealing distance** – neither the current CEMA nor European standards provide “adequate edge distance to accommodate the belt tracking and sealing systems required to meet today’s requirements for dust and spillage control. The free belt edge available for sealing the belt and allowing for belt mistracking should be at least 115 mm, regardless of belt width.

- **Poor chute design**

- **Inadequate belt cleaning**

- **Substituting speed for belt width**

- **Failure to allow for upgrading**: “Use standard components to meet price targets but allow space in the design for problem solving upgrades to meet production/cost targets.”

The Beumer Group notes that mines are requiring belt conveying systems that are capable of moving increasingly larger volumes over growing distances across impassable and mountainous terrain.

Beumer offers closed tubular belt conveyors or open troughed belt conveyors. The tubular belt conveyors are suited, for instance, for powdery material and on steep routes, the open troughed belt conveyors are used for coarse material.

These conveyor systems can negotiate rugged terrain and other obstacles, such as rivers, streets, buildings or rail lines. This reduces the costs of moving earth and expensive transfer points are significantly reduced. Horizontal and vertical curves can even overlap.

Beumer notes “the motors in these systems can be controlled, making optimal load distribution in the belt possible in all operating conditions. Depending on the terrain and loading condition, the systems can also operate as generators. The generated electric energy is fed to the mains by a regenerative feedback unit, helping to reduce energy costs for operating the whole system.”

The Beumer belt conveyor has demonstrated its qualities in rough mountainous terrain, with bamboo woods and flooded areas, with a curved troughed belt conveyor for the Asia Cement Group in Sichuan, China. Over a length of 12.6 km, the company developed and installed a system for limestone transport between the mine and the cement plant.

This system moves, at its very peak capacity, up to 2,649 t between the quarry and the plant. While the upper strand transports 2,028 t of limestone to the plant, the return strand can transport, at the same time, 621 t back to the quarry. Thus, Beumer says “the troughed belt conveyor achieves a capacity and an energy efficiency that clearly exceeds the capacity of other means of transport on wheels or rails.”

One 1.5-km-long section of the transport route passes over a reservoir. The route involves horizontal and vertical curves, over bridges and through a tunnel, achieving an average capacity of 1,500 t/h and a conveying speed of 4 m/s. There are differences in height of up to 100 m.

There are eight horizontal curves having radii of just under 1,000 m and up to 5,000 m and Beumer determined the exact tractive force of the belt in simulations. The routing defined by the engineers was checked for its feasibility on site. The complete route of 12.6 km was checked on foot, passing through rough terrain, in order to check the predefined positions for the 460 supports for their suitability to the last millimetre directly on site. It turned out that a granite section 130 m in length had to be tunnelled. To keep the total cost as low as possible, Beumer set up horizontal curves in sections with large differences in height and overcame some of the mountainous terrain using bridges of heights up to 55 m.

The belt had to be vulcanised in 56 areas. Its width is 1,200 mm with a strength of 2,800 N/mm. In addition to the eight horizontal curves, the conveyor covers the terrain with 28 vertical curves. In order to control the tractive forces of the belt in the six descending and six ascending sections, the system is operated with special drive units and a Beumer control system. The installed drive power amounts to six times 500 kW, frequency-controlled by the Beumer control system. The power is divided by two drive pulleys “positioned in the feeding and in the head area of the system. One pulley is designed as a twin drive [of] 1,000 kW and one as a single drive [of] 500 kW. Instead of a movable counterweight, a take-up winch is used. With the help of this take-up winch the weight is adjusted once and frozen geometrically.”

The Asia Cement Group subsequently commissioned Beumer to construct a curved troughed belt conveyor system in Sichuan, China.

**Pipe conveyors**

The Greenbank Group UK has signed a Technical Collaboration Agreement with Bridgestone in relation to the design and supply of pipe conveyor systems. The agreement will see Bridgestone provide Greenbank’s Materials Handling division with technical services for Greenbank Pipe Conveyor solutions which incorporate Bridgestone’s world-class belt design.
Pipe conveyors provide considerable environmental and economic advantages. By using an enclosed belt system, pipe conveyors minimise dust generation, protect from contamination, and prevent spillages whilst also accommodating steeper inclines and requiring much less floor space than a conventional belt design.

Charles Conroy, Greenbank’s Managing Director: “Having pioneered the pipe conveyor, Bridgestone’s technical knowledge and operational experience in this field is second to none. This agreement gives Greenbank access to an unrivalled level of technical expertise which will undoubtedly help further enhance our pipe conveyor portfolio.”

Mr Nakaegawa, General Manager, Conveyor Belts Sales and Marketing: “Bridgestone is committed to working with companies that deliver exceptional products and services for the materials handling industry and the Greenbank Group has an excellent reputation in this field.”

Superior Industries offers a new option for maximum conveyor mobility. The track-mounted mobile pivot base, when applied with the TeleStacker™ telescoping radial stacking conveyor (or other conveyor types) delivers free-ranging conveyor movement for increased on site or transfer point mobility; or for increased flotation and total mobility on low pressure soils – all while reducing the need for haul trucks and loaders, additional labour and material handling, or other costly loading and unloading systems.

Requiring no external power, the mobile pivot base is self-contained and powered by an onboard Deutz diesel engine. Featuring wireless remote control operation, the unit travels on two heavy-duty, hydraulic-drive rubber tracks. For greater stability and maximum flotation, the tracks are almost 2.7 m in length, more than 40% longer than comparable units, Superior claims. An ability to maximise speeds for either the lower or higher range, allows precise control to link up to a feed point, or quicker travel from point to point within the site. Importantly, the mobile pivot base is engineered with a two-axis gimbal, which provides maximum stability and rotational freedom on uneven ground or rugged terrain, while eliminating any stress to the conveyor structure and frame.

Superior has also introduced the Trailblazer™ portable groundline conveyor, which it describes as “a new first-of-its-kind overland conveying system. This highly mobile, fully-belted and assembled groundline conveyor is easily towable from site to site, allowing rapid deployment from the road to working status in just about an hour. Unlike any other groundline conveying system, which would require days or even weeks for setup or teardown, the Trailblazer is designed to deliver unprecedented savings in costs and manpower, while also eliminating the downtime associated with the erection of traditional systems – and the need to transport material onsite via costly trucks or loaders.”

The 152.4 m long Trailblazer features a 914 mm belt; two 18.6 kW 1,800 rpm TEFC motors; a capacity of over 900 t/h; a belt speed of 2 m/s; Superior CEMA C idlers; gravity style take-up; and a Superior Exterra® belt cleaner.

Fully-belted with drive and gravity style take-up built into the trailer structure, the Trailblazer simply folds in or out easily and quickly in an accordion-fashion with a minimal crew required to position the supports. Its towable package is equipped with a fifth wheel hitch, brakes and directional lights.

Containing dust and fines is a non-negotiable today, says Richwood. “Safety, productivity and efficiency are at risk when load zones become housekeeping headaches.” For over thirty years it has been providing load zones solutions for material handling.

Richwood’s philosophy of containing bulk materials and fines consists of “three basic principals that will create a safe, trouble-free load zone:
1. Establish correct belting elevation for consistent support. We recommend the impact resistant cradle shaped Combi-Pact®Impact Saddle with seal bar
2. Next, provide load zone containment structural support
3. And lastly, but very importantly, use wear liners such as Richwood Canoe Liners® for containing bulk material flow while providing excellent wear resistance. Richwood Canoe Liners use specially formulated rubber with optional ceramic matrix to deal with the problem of abrasion from passing material. Canoe Liners are also easy to work with. In contrast to most liners, these Canoe Liners come in standard sizes that are easy to install with a bolt on feature and manageable sizes. They can be furnished up to 101 mm thick as required by the application. Canoe Liners also come with a ceramic bevel, the beveled edge assures best sealing with the belt. On the outside of the chute add Combi-Clamp® Skirt Clamps combined with Richwood Skirt Rubber for complete sealing of small particles, dust and fines.”
Busy load zones can be well equipped to handle the demands of productivity when partnered with dependable components.

**Efficient pulleys**

Conveyor belt slippage, poor traction, poor wear properties, inadequate water shedding and resultant high running costs and lower productivity are common conveyor operation problems. Multotec says its Direct Bonded Ceramic Pulley Lagging has become the widely accepted solution for mining and industrial operations as a cost effective response to these recurring problems.

“Multotec’s studded ceramic pulley lagging is particularly effective in aggressive conditions, even on bucket elevators or where material is inevitably trapped between the pulley shell and the conveyor belt,” Faan Viljoen, Technical Director of Multotec Wear Linings, says.

“Ceramics have a significantly longer life compared with traditional rubber pulley lagging where material is removed from both the rubber lagging and the rubber belt bottom cover when belt slippage occurs. A further benefit of direct bonded ceramic lagging is a significant extension of the useful pulley life.

“We apply the studded tile lagging to drive pulleys, and smooth high density alumina ceramic tiles are used for non-drive pulleys,” he continues. “Traction is improved considerably, even under wet and slippery conditions. The insignificant ceramic wear rates will improve plant availability and reduce pulley and conveyor belt maintenance costs. While it is true that the ceramic material is slightly more costly than conventional rubber lagging, this is more than compensated for by its extended lifecycle of at least 20:1 compared to the usual expected life of rubber pulley lagging. This ultimately impacts very positively on the bottom line.”

The direct bonded ceramic lagging also reduces any danger of fire in instances where slippage continues and practically eliminates carcass and splice damage caused when the belt does grip.

Launched in mid 2009, the Bucyrus Flex Pal™ series offers customers not currently using Bucyrus roll products an easy upgrade path to Bucyrus-quality idlers for underground applications. Featuring a unique retrofit design, Flex Pal rolls are easily integrated into existing structure. They are available in CEMA C & D ratings with 101.6, 127 and 152.4 mm diameters for belt widths ranging from 762 to 1,524 mm.

Flex Pal can be used with carrying assemblies for roof-hung, floor-mounted and wire-rope structure, all three types using Bucyrus handle & pin rail connections. Installation is quick, with no special tools required. The idlers are of unique design, each consisting of two steel rolls and one center Exalon® roll. The centre roll is subject to the greatest wear and requires more frequent replacement. Exalon – a proprietary high-molecular-weight polyethylene – not only offers two to three times the life of a steel roll, but is also lightweight, sound dampening, resistant to material buildup, reduces belt damage, and is cost-effective.

All Flex Pal rolls are greased for life with Idler PAL® – Positive Automatic Lubrication. A spring-loaded compensator disk allows grease to expand when hot and compresses it as the bearing cools. This ensures.

For Flex Pal, Bucyrus offers a standard warranty of three years to life, as opposed to the industry standard of about six months.
a constant pressure on lubricant in the bearing regardless of changes in volume.

Like all Bucyrus rolls, they are triple tested – with measurement of the three most critical parameters: rotational drag, total indicated run-out and bearing end play. And, as another industry first, each roll is engraved with a unique serial number to allow tracking throughout its service life.

**Intelligent control**

Twiflex, a leader in advanced braking technology, has launched a new intelligent controller for conveyors. It describes SMARTBrakeT as “a new concept in controlled braking. Intelligent braking allows ramping up/ramping down times to be maintained independently of system load and frictional changes. The secondary function with this type of control is to allow a customer pre-defined non-linear braking profile to be used.

The advantages include:

- Profiles can be selected to minimise ‘jerk’ to allow smooth stops and therefore reduce the risk of mechanical damage to the system
- Stopping times/distances will always be met - a specified braking time is maintained
- Repeatability, accuracy and general performance are not affected by the mechanical wear of the conveyor system.

Braking control is activated by a voltage input to the controller. An optical encoder mounted on the drive drum shaft measures the rpm and this signal is fed in directly in the form of 500 quadrature pulses per revolution.

The controller is pre-programmed to compare rpm against time to a pre-programmed ramp down velocity rate which is suitable for optimum conveyor acceleration/retardation. There are standard ideal braking profiles, however alternative profiles may be specified by the customer and downloaded to the controller during installation.

During braking, if the measured speed becomes lower than the ideal speed, the difference (or non-zero steady state error) is electronically amplified and sent to the brake system to decrease braking torque. Conversely, if the measured speed is higher than the ideal speed at any point during the braking sequence, the braking torque requirement increases in order to match the ideal speed of the conveyor at that point in the braking sequence.

During the braking sequence, the braking torque is adjusted 400 times a second ensuring that the deceleration profile of the conveyor system matches the specified ideal braking profile.

Nicole Hampton, Manager Business Development at Synergy Engineering told *IM* that “with the general industry push towards the use versatility of variable frequency drives (VFD) for any and all industrial applications, we see more and more VFD’s mis-applied to large overland conveyors. But MV VFD’s have higher cost and lower efficiency as applied to a large overland conveyor, not to mention increased complexity.

“Consider an overland belt conveyor
powered by 3 x 2,000 kW drives in the Atacama desert some 3000 m above sea level: Wound rotor induction motors with correctly designed resistive control packages have higher constant speed efficiencies at all loading conditions, even with load sharing requirements between drives.

“The control package can be installed outdoors, is not sensitive to altitude, temperature, or dust, and can be maintained or repaired by any site electrician. In contrast, the popular MV VFD system must be installed in a climate controlled electrical room, usually with an isolation transformer, and some form of harmonic filtering, professionally maintained and/or troubleshooted, and results in lower system efficiency. In fact, even with three starts per day, the overall savings of operating that conveyor with the Wound Rotor Induction Motor (WRIM) solution can be in the hundreds of thousands of dollars per year. This does not take into account the higher purchase price of a MV VFD + motor system, the increased electrical room size to house the VFD, the cost of additional HVAC requirements, and the cost of professional services to Commission, maintain, troubleshoot, and provide firmware upgrades for the VFD over the years.”

She summarises this example with the table (below).

ASGCO’s patented Tru-Trainer conveyor belt tracking idlers provide solutions to problems experienced with tracking and aligning of conveyor belts. The company has developed a full range of trackers for tracking the return and load-carrying side, from slow belts all the way through to high-speed, high load belts.

One of the challenges in tracking conveyor belts is that each belt has its own characteristics, and therefore there is no one answer to track every type of conveyor belt. Yet, for the most part the industry is using conveyor-tracking technology that is 25–50 years old, ASGCO says. These trackers do work in some applications but have their problems, such as damaging the edge of the belt, damaging the belt carcass, not working on wet applications and center pivot seizures.

ASGCO examined the problems with existing trackers and combining that with company experience, engineers set out to design a tracker. It was agreed that a good tracking roller:

| Must operate in both dry and wet conditions |
| Requires a minimum force to activate the tracking mechanism |
| Does not rely on the edge of the belt to activate the tracking mechanism |
| Is maintenance free |
| Has vibration free rolling action |
| Has minimum working parts |
| Is simple to install |
| Maintains good traction with belt |
| Durable design. |

### Detecting ripped belts

Jonathan Krane, Business Development Manager, says Conveyor Belt Monitoring’s newly developed belt rip detection system is “flexible enough to be designed to suit any belt width, belt type (steel cord, fabric or solid woven) and anywhere in the world. The CBM – Rip Detection System provides a reliable, non-contact (nothing embedded or in contact with the belt), 24/7, on line and in real time monitoring system for detecting a catastrophic longitudinal rip in a conveyor belt before it has progressed in size sufficiently to require the replacement of an unduly large segment of the belt or the belt itself.”

CBM International, in developing this system, had to throw out the current methodologies and use a clean slate. He says there are two real issues. Mines want conveyor

<table>
<thead>
<tr>
<th>WRIM with secondary resistive control</th>
<th>SCIM with MV VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purchase price</strong></td>
<td>Higher</td>
</tr>
<tr>
<td>Maintenance cost (including brush replacement, firmware upgrades, average drive adjustments and troubleshooting)</td>
<td>Lower; can be done easily by site personnel, and can be part of planned maintenance</td>
</tr>
<tr>
<td>Motor efficiency</td>
<td>95-96%</td>
</tr>
<tr>
<td>Drive system efficiency</td>
<td>94-96% (includes resistance used for load sharing IF required, and motor)</td>
</tr>
<tr>
<td>Installation environment</td>
<td>Outdoors, resistors open to dust and temperature variances, not sensitive to altitude</td>
</tr>
<tr>
<td>Power factor</td>
<td>Corrected via addition of capacitors if necessary</td>
</tr>
<tr>
<td>Controlled starting</td>
<td>Yes (less efficient)</td>
</tr>
<tr>
<td>Controlled stopping</td>
<td>Sometimes (less efficient)</td>
</tr>
<tr>
<td>Creep control for belt spotting</td>
<td>Yes (less efficient)</td>
</tr>
<tr>
<td>Operating at 100% load, rated speed</td>
<td>Higher efficiency than VFD system</td>
</tr>
<tr>
<td>Operating at varying load, rated speed</td>
<td>Efficiency of only the motor is affected; drive efficiency remains constant</td>
</tr>
<tr>
<td>Reliability and Drive Life</td>
<td>Higher and longer</td>
</tr>
</tbody>
</table>
belts to operate with the absolute minimal downtime for maintenance to keep them running at maximum throughput and in an ideal world that would be 24/7 for 365 days of the year at full capacity operation. The other issue was to identify what constitutes a catastrophic failure and then to identify how to minimise its effect on the mining operations. In answering the first point, he says "the 'false positives' generated by the current systems of longitudinal rip detection are the single largest areas of grief. Each of these false positives is a costly exercise as the belt stops operating, staff are required to travel to the place of the alarm assess the damage or lack thereof, rectify and re start the belt. "In answering point 2, a 'catastrophic longitudinal rip' is full penetration, continuous rips that threaten the existence and usefulness of the belt. The minimisation from a mines point of view, is the reduction of the amount to be repaired and the time of repair to say no longer than an extended lunch break."

CBM using vision and laser technology combined with its own systems has developed a detection system that identifies catastrophic longitudinal rips (full longitudinal penetration of the conveyor belt) and activates the stopping of the belt. This system is separate from the belt and can be fitted and retrofitted to any belt, anywhere at any time. There is no contact with the belt and hence the removal of false positives due to loading related issues or minor cuts and abrasions. The system monitors in real time and once a mine has specified the parameters (eg: a rip of say 1,000 mm plus) the CBM-Rip Detection System will activate the emergency stop once this event has occurred. CBM recommends that the stopping trigger be any event greater than 500 mm in length detected, as the distance from the load point and the stopping distance also needs to be taken into account.

**AC drives**

Pekka Pulkki, Market Manager/Cement and Mining for ABB Oy, Drives, explains that AC drives help protect belts and other mechanical equipment by offering smooth and accurate control of the motor speed and torque, prolonging conveyor lifetime while lowering operational and maintenance costs. Also, if a joint within the belt needs repairing, the AC drive will enable the user to move the belt into position very accurately.

Conveyors with a very high starting torque have the potential to damage both the mechanical equipment and the power supply. On long conveyors in particular, the loads can be very high, as there is more material on the belt, with higher starting torque and more current required. Soft starters can be used to reduce starting current, but they also reduce the torque. If the conveyor is fully loaded at start-up, it may not start at all if the torque is insufficient.

The AC drive offers high starting torque combined with low starting current, eliminating current peaks and voltage fluctuations on the network. In addition, power factor is close to unity all the time. With a more stable network, all electrical equipment on the site runs more reliably, increasing productivity and reducing the need for maintenance. Smooth starting with accurate torque also minimizes belt stretching and slipping. On belts that are already stretched, the AC drive minimises the risk of slipping.

As well as protecting the conveyor belt, AC drives provide efficient operation by offering smooth and accurate control of motor speed, enabling adjustment of the speed to suit the needs of the process. The drive can also be connected to the plant's automation system, which can monitor the load and speed and use...
these parameters for volume calculation.

Providing the motor and the mechanical equipment are suitable for a higher speed, the conveyor speed can be increased freely. In applications where the speed needs to be reduced below the motor's nominal speed, motor cooling can be an issue if self-cooled motors are used. This can be addressed by using force-cooled motors.

AC drives help protect conveyor belts from stretching, slipping and breaking.

**Saving energy**

Energy can be also saved by running the conveyor at reduced speed when full speed is not required. Energy savings can be made by eliminating reactive power compensation, which is no longer necessary when using an AC drive.

Further savings are achieved by using the power generated when a conveyor travels downhill; where conveyors run over long distances and across rough terrain, they are frequently generating for much of the distance. With an AC drive, it is possible to run the conveyor smoothly across the whole conveying distance, even if there are large differences in horizontal and vertical curves. All the braking energy can be generated back to the network when using an AC drive. Another way to use the braking energy is to use a common DC bus drive system, where several AC drives are connected together with the DC busbars and braking energy is fed from the motors that are braking to the motors that are driving.

Further benefits are possible when using a drive with the direct torque control (DTC) motor control platform, available with ABB industrial drives. For instance, load sharing can be arranged between motors on the conveyor. An equal load ensures that the motors do not overheat and trip out, disrupting the transport of material.

DTC also detects when the load on the conveyor belt rises suddenly, increasing the torque requirement rapidly. This is detected instantly and the drive can immediately react to the change in torque. A drive with a less sophisticated torque control system may trip in these situations.

Ciment Vigier in Switzerland uses a two-conveyor system to transport limestone from a deposit 2,642 m from the plant in the valley below. With a difference in height of 273.8 m at an inclination of up to 28° to be overcome, the challenge for the company was to save energy while using as few conveyors and transfer stations as possible.

The tubular belt conveyor is equipped with one drive pulley, two 160 kW squirrel cage induction motors and two ABB industrial drives. The second, the trough belt, is equipped with three 160 kW squirrel cage induction motors and three ABB industrial drives. All five drives are coupled to the same supply unit in a common DC busbar arrangement. To reduce the spare parts stock, identical motors and drive systems are used.

This construction simplifies the total installation and saves cabling, reduces line currents, simplifies the braking arrangements and enables energy circulation over the common DC busbar. The 350 kW of braking power generated is transferred to the mains using an energy recovery unit, reducing the energy consumption of the complete system significantly.

Using a common DC bus ensures optimal load distribution on the individual drive units for different operating conditions. This has enabled ABB to minimise the resulting belt tensile forces, maintaining the belt forces necessary to transmit the required drive power in both driven (generator) as well as driving (motoring) operation.

AC drives also help to simplify the conveyor drive system, potentially reducing investment costs as well as maintenance needs. With motor speed adjusted for the application, the gear ratio can be optimised and a simpler gearbox can be used. In some cases it may be
The idea behind Doppelmayr's RopeCon® was to develop a continuous conveying system that reduces environmental footprint to a minimum and, at the same time, works cost-efficiently. It consists basically of a belt with corrugated side walls and integrated wheel sets which run on fixed, anchored track ropes guided over tower structures. The hauling function is performed by the belt, and with the wheel sets integrated in the belt, virtually all mechanical equipment ‘returns’ to the station where it can be easily and economically maintained. After the material has been discharged, the belt is turned soiled side up again to eliminate any ‘carryback’.

This continuous bulk material and unit load handling conveyor combines the benefits of well proven ropeway technology with those of a conventional conveyor belt (hence the name). It offers conveying capacities of up to 25,000 t/h, conveying lengths of 30 km in one flight and handles inclinations of more than 60°. The system operates off the ground, thus minimising space requirements and easily crossing buildings, roads, rivers, valleys or other obstacles. The adaptation of the conveyor to the natural terrain allows for a straight conveying line with only a minimum of line structures and tower distances of up to 1,500 m. The implementation of the installation requires only a very narrow line corridor, even when installed in difficult terrain and does not lead to habitat fragmentation. Therefore, no wildlife corridors are necessary. In addition, the use of this conveyor allows reducing CO₂ and fine dust emissions to a minimum. A very low noise emission of only 55 dbA at a distance of 1 m as well as the system's low energy consumption are other benefits of the RopeCon.