

A large industrial conveyor belt system is shown in the upper portion of the image, with a blue overlay covering the lower portion. The conveyor belt is filled with dark material, and the structure is supported by metal beams. The background is a clear blue sky.

Extreme Conveyor Belt Solutions

Customized for highly complex applications throughout the world



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Customized conveyor belts for highly complex applications throughout the world

The world's largest excavator shovels 240,000 cubic meters of overburden and coal a day in Germany. Chile conveys copper from a mine in the Andes at an altitude of 5,000 meters.

And the longest belt conveyor on earth carries limestone from India to Bangladesh. PHOENIX conveyor belts meet all these conveyance needs. Safety. Reliability. Efficiency.

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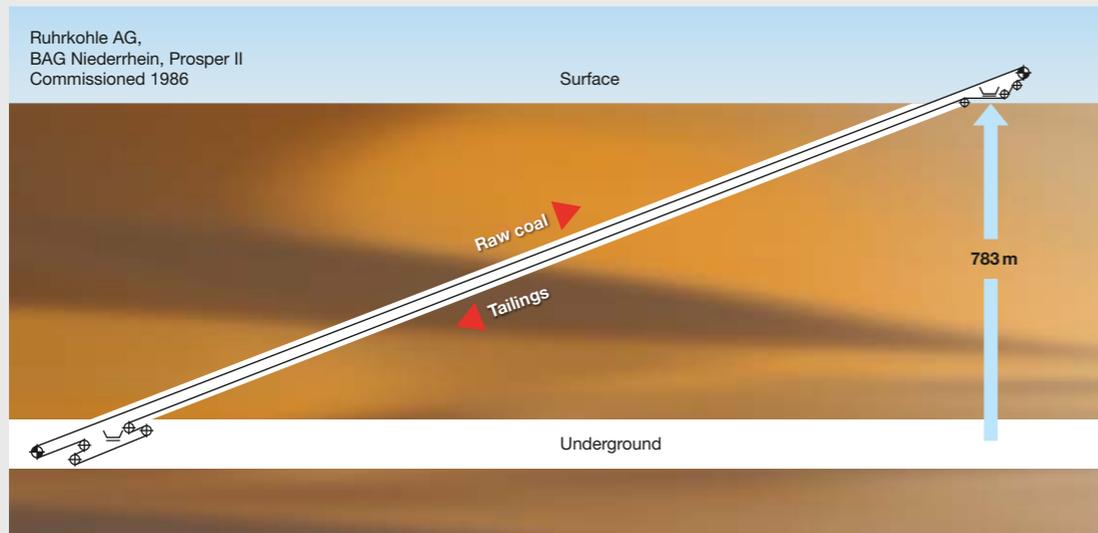
PHOENIX
Extreme Conveyor Belt Solutions

Efficiency

Efficiency ...

Task →

Bottrop, Germany: In the Ruhr region, four separate coal mines have been merged into one. To achieve this enormous undertaking, RAG Deutsche Steinkohle planned for a revolutionary incline slope conveyor to be built at the Prosper Haniel mine. The coal was to be extracted in four separate operations at depths between 700 and 1,300 meters and brought to the surface via a belt conveyor. With a vertical elevation of approximately 780 meters, the belt required for this system was not only the largest and most efficient ever designed, but the strongest. The system is required to convey millions of tons of r.o.m. coal to the surface from a depth of around 780 meters, while simultaneously conveying millions of tons of tailings on the return run back to the bottom of the mine.



→ Solution

PHOENIX developed a completely new conveyor belt: The PHOENOCORD St 7500, until today the strongest underground conveyor belt worldwide, with a width of 1400 mm. The system, fitted with the first gearless drive seen anywhere in the world with 99% efficiency, is simultaneously conveying 2000 t/h of r.o.m. coal upward and 1000 t/h of tailings downward.

Since the rock on the return line had sharper edges than the coal, the lower cover plate was designed to be thicker. Both belt covers were equipped with the special PHOENOTECH active belt protection system.

The PHOENOCORD St 7500 conveyor belt complies with the most stringent safety requirements in the world and has been setting benchmarks ever since for meeting demanding conditions of use in the mining industry.



Robustness

Robustness ...

Task →

Elsdorf, Germany: The site of the world's largest bucket wheel excavators. RWE utilizes these excavators to remove overburden and recover coal with the largest mobile mining machines at 220 meters length, 96 meters height and weighing 13,500 tons. These enormous machines move 240,000 m³ per day at a rate of up to 40,000 tons per hour. These production requirements exert the highest demands not only in the volume conveyed but in moving rocks measured in square meters.

From a height of up to 18 m, material, sometimes containing rocks as big as the blocks of the Cheops Pyramid, tumble down the conveyor systems. This is hardest work and poses a considerable challenge to the conveyor belts that move the material safely onward.



→ Solution

To transport this huge volume of material reliably and safely while withstanding considerable impact forces, PHOENIX supplied the world's widest conveyor belts that are unparalleled in terms of durability. With a belt width of 3200 mm and an overall gauge of 45 mm, these belts are ideally designed to withstand the forces exerted upon them. PHOENIX has designed these belts with PHOENOTEC reinforcement system which incorporates specially designed individual transverse cords to minimize belt damage. PHOENOTEC has been proven to withstand the highest impact forces in both laboratory and extensive field testing. It resulted in tripling the working life of the belts.

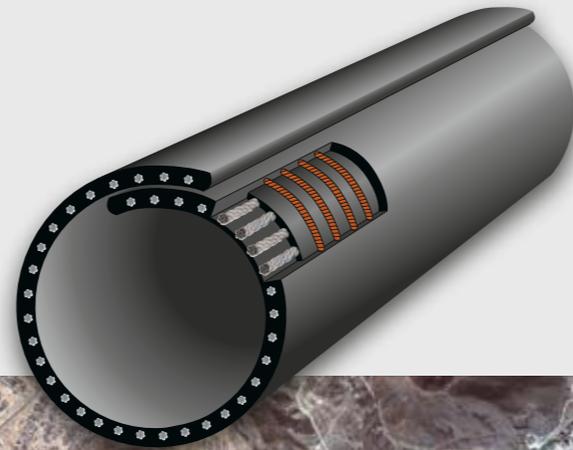


Adaptability

Adaptability ...

Task →

Lima, Peru: On the outskirts of the city is a cement plant located in the foothills of the Andes mountains. Previously, raw materials were transported by trucks to the plant from the port facility and finished product back to the port, a trip of 8 kilometers each way. Traffic congestion, exhaust emissions and safety concerns through large residential and industrial sections of the city threatened to close the plant if a more environmentally friendly solution was not found. Representatives from the company and the city met to discuss a range of solutions until a viable outcome was resolved by parties on all sides.



→ Solution

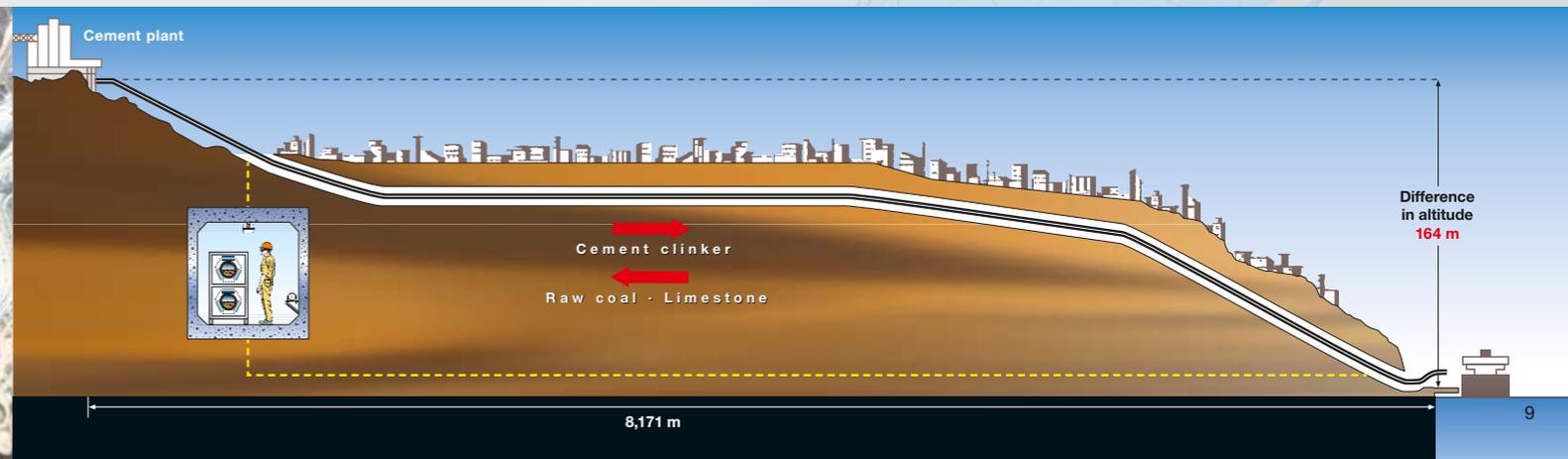
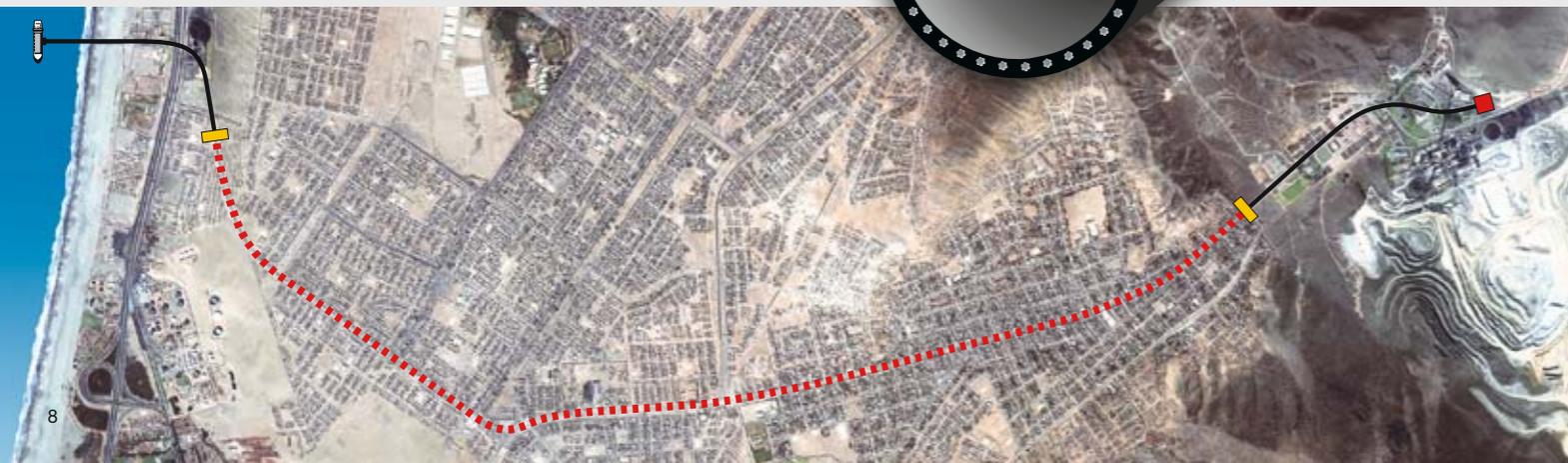
A tunnel below the main street, with a curved conveyor belt carrying clinker from the plant to the port, while simultaneously transporting coal and limestone from the port to the plant. The result has positively impacted Lima residents by significantly reducing traffic congestion along with air and noise pollution.



The conveyor needed to accomplish this task is required to follow the road system through horizontal and vertical curves on a precise route. This included three-dimensional curves the tightest of which had a radius of 300 meters.

PHOENIX took this extremely difficult challenge and constructed a closed pipe belt specifically for this application with a 300 mm diameter. The unique construction of this 16.4 kilometer PHOENIPIPE belt ensures optimal stability for a variety of loading conditions in the top and bottom runs and guarantees the belt remains safely closed in all conditions. The belt's stability and maneuverability were rigorously tested prior to installation.

Pipe Conveyor Project Atocongo, Peru



Environment

Environment ...

Task →

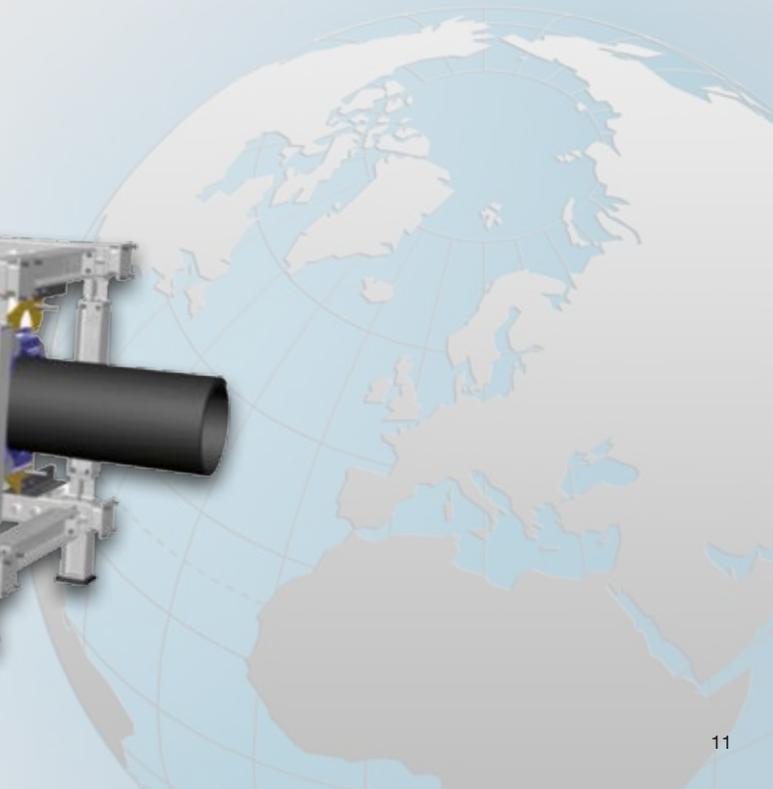
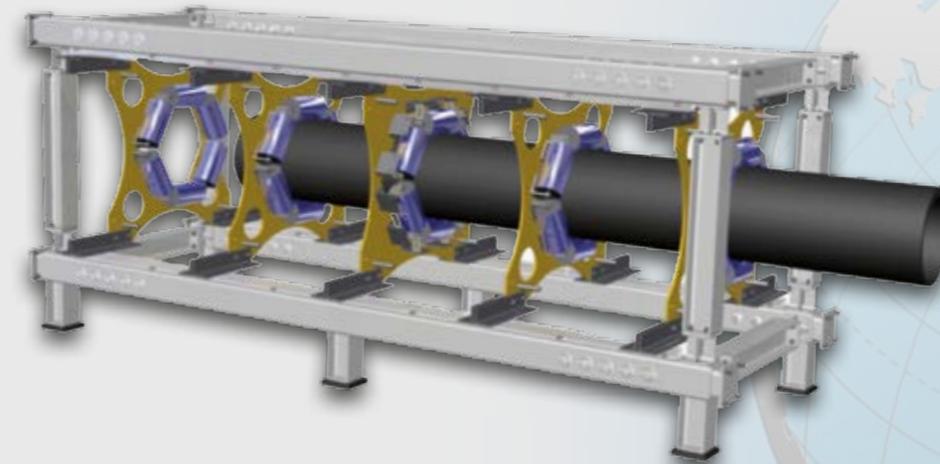
Pará Region, Brazil: In northeast Brazil, located in the Tapirape-Aquiri National Park, lies South America's largest copper mine. Aside from copper, the region is also extremely rich in other natural resources such as gold, tin, bauxite, crude oil and iron. The Pará region is not only a reservoir of raw materials but is also an ecologically sensitive area with unique plant and animal species, a part of Amazonia, the largest tropical rain forest on earth.

The Amazon basin is earth's central green lung and of paramount importance to global climate. Consequently, industry and mining here are bound by strict environmental restrictions. To provide optimal environmental protection, a conveyor line was required to carry copper ore and overburden while causing minimal damage to the fragile ecosystem.



→ Solution

PHOENIX takes its responsibility toward our planet seriously and designed a conveyor belt for this application. The closed PHOENIPIPE conveyor belt ensures that all material is safely contained and that no material, dust or other fine particles are released into the environment. PHOENIPIPE closed conveyor belts are growing in popularity due to their ability to meet ever increasing environmental protection requirements.





Size

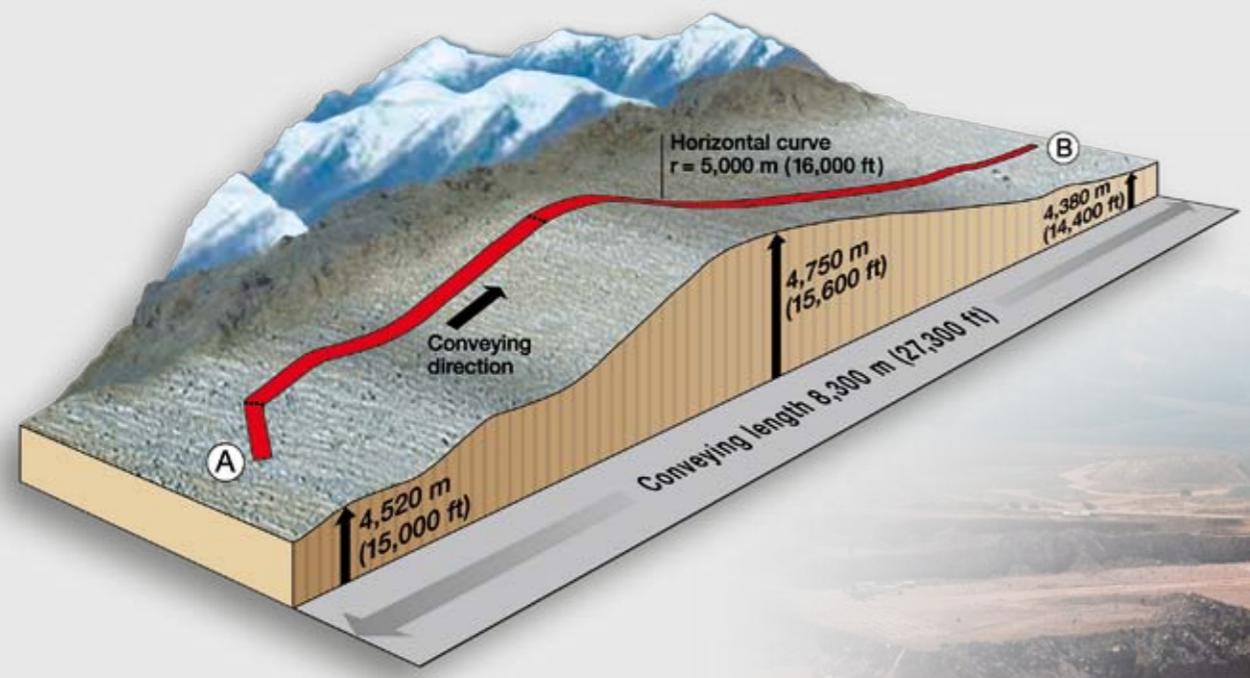
Size ...

Task →

Tarapacá Region, Chile: Some 5000 meters above sea level in the Chilean Andes, the Collahuasi mine is the fourth largest copper mine on earth as well as one of the highest. The ore is mined from 7.6 billion tons of rock and has a projected mine life of 50 years. The project required a high tension steel cord overland belt that could be delivered in the longest possible roll lengths in order to minimize splices onsite at almost 5000 meters on the Andean plateau.

→ Solution

PHOENIX undertook this technical and logistical challenge by supplying a PHOENOCORD St 6300 in the longest roll lengths ever produced. To meet the clients requirements for minimizing splices, belts were produced in 415 meter lengths and delivered on the largest belt reels in the world. The belt reels were 5.2 meters long, 4.2 meters high and weighed 58 tons. They were transported to the mine site on specially designed low loaders.



Safety

Safety ...

Task →

Safety is a top priority in the mining industry. In the past, conveyor belts with flame-retardant properties have been used particularly in underground coal mines. Even though the belts had low flammability properties, they could not withstand burning when exposed to a constant combustion source. This would allow for fire propagation along the belt line over long distances. The result had fatal consequences for miners, and destroyed machinery, equipment and infrastructure. A string of tragic accidents forced a change in policy and the industry has called for significantly higher safety standards ever since.

→ Solution

PHOENIX has always attached a great deal of importance to safety. PHOENIX was the first to bring self-extinguishing steel cord conveyor belts to market in 1974. The first belt supplied to a German coal mine, was produced based upon intensive research and development that still meets the world's most stringent flammability safety requirements. These standards have now been implemented into the safety regulations by most countries worldwide.

In addition, PHOENIX supplied Australia's and China's first steel cord conveyor belts manufactured in compliance with the latest international safety regulations. It is through our commitment to safety that PHOENIX continues to be the world leader in these product developments.





Symbiosis ...

Symbiosis

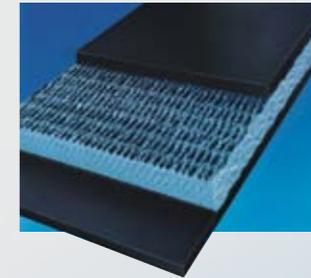
Task →

For many decades two types of textile conveyor belts have been conventionally used in underground mining. These were equipped with cover compounds made from PVC or rubber. PVC was ideal for providing stabilization to the belt carcass but had limited abrasion resistance. Material stabilization on high incline conveyors and excessive wear to other components such as idlers was an ongoing problem. To minimize these deficiencies, the idea of combining the two components in order to optimize their properties took hold. PVC was to be used to reinforce the solid woven belt carcass, and rubber covers were to be utilized to optimize the wear properties. What sounded promising in theory proved problematic in practice. Producing the two into a cohesive, durable product presented challenges.



→ Solution

PHOENIX utilized its extensive expertise in research and development to solve this problem in 1979. A special process was developed to bond PVC to rubber in a perfect symbiosis of the two materials. The process has set a new benchmark in the belt manufacturing industry and has become a top global standard. PHOENIX's UNIFLEX PVG provides the highest level standard for performance, safety and economical operation for underground mining. All products are certified in accordance with DIN and other international quality standards.





 **PHOENIX**
Extreme Conveyor Belt Solutions

Length

Length ...

Task →

Located in a vast plain of northeast Bangladesh lies the Lafarge Surma cement factory. As the factory does not have its own source of limestone, the raw material must be procured from a mine in India several kilometers north. An unprecedented cross-border agreement was closed by both countries to ensure limestone supply on an ongoing basis. Transport was not a viable option via rail or truck due to geography, extreme weather conditions and other environmental factors. The partners decided in 2000 to build a 17 kilometer long conveyor from the mine to the plant supported on trestles through extremely difficult terrain.



→ Solution

The belt designed by PHOENIX for this single flight conveyor is nearly 35 kilometers long and is the longest conveyor belt in the world. It only has two drives, each at head (two motors) and tail (one motor), and no intermediate drives. The conveyor transports 1.2 million tons per year utilizing 2 x 630 KW head drives and a 1 x 630 KW tail drive. The 800 mm wide St 2500 PHOENOCORD belt has a high dynamic efficiency and low elongation, making it ideal for the application and terrain. The design requirements to meet thermal, chemical and environmental parameters ensure low maintenance and long life making it an economically sound solution.

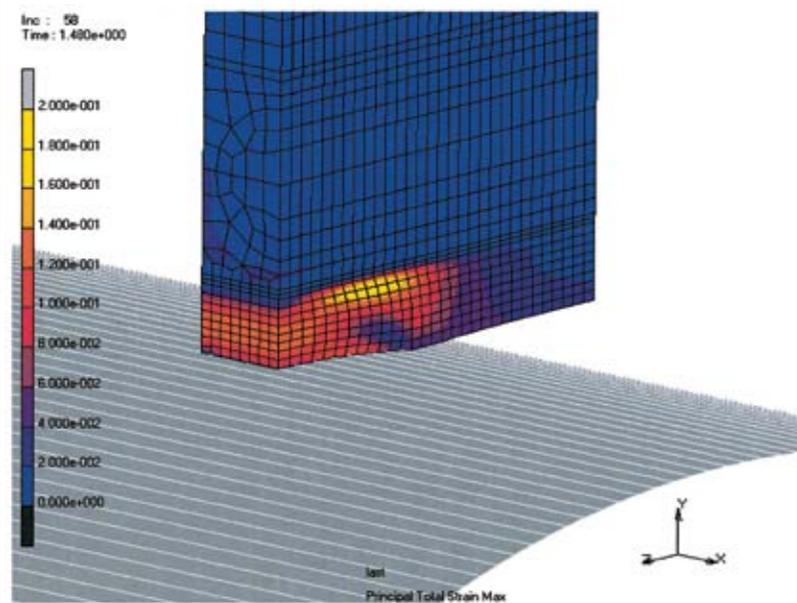


Energy Saving

Energy Saving ...

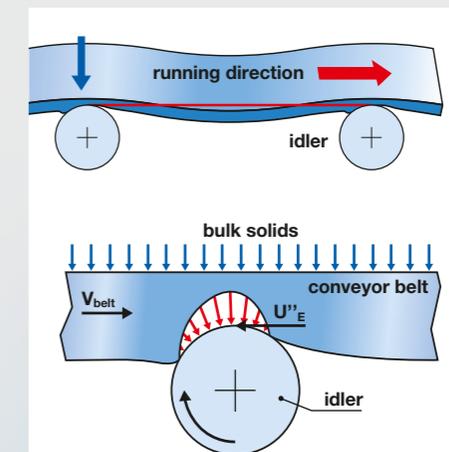
Task →

Conveyor belts are used for multiple purposes having high efficiency, reliability and provide one of the most economical forms of bulk material transport. Companies however, are placing a stronger emphasis on sustainability as well as environmental and climate protection. Energy consumption is becoming a more important factor in conveyor applications. Longer conveyors and higher production demands are driving engineers to seek new alternatives to reduce energy demand. Minimizing the belts deformation while in contact with conveyor components such as idlers has become a high priority.

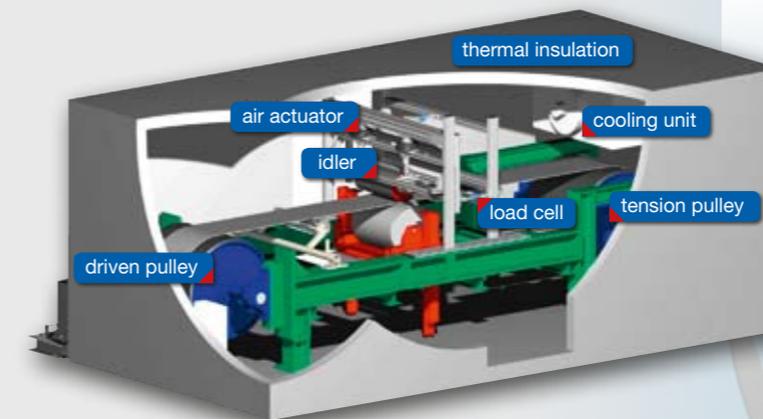


→ Solution

The responsible use of resources and energy has always been a top priority for PHOENIX. After decades of extensive research and field testing, PHOENIX launched the first generation of energy saving EOB belt back in the 1970's. Today, large numbers of EOB belts are in operation throughout the world. With its unique visco-elastic properties, the PHOENOCORD EOB belt can reduce energy consumption by up to 20 % as compared to conventional belts. These results are substantiated through standardized testing at the University of Hanover in Germany as per DIN 22123.



The conveyor belt is deformed when running over the carrying rollers, which consumes energy. Bulges form in front of the carrying rollers.





Longevity ...

Longevity

Task →

Cilegon is located in western Java approximately 120 kilometers from the capital of Jakarta. Here on the Sunda Strait, a large industrial complex arose in the late 1970's. Steel works and power plants were built at the Krakatau steel factory with rail systems, roads and pipe lines encompassing the landscape. The port facilities however, required a conveyor system with a particularly long life design. The belts were subjected to high ultraviolet radiation, humidity and temperature exposure.

→ Solution

Economical, long life and durable are characteristics that set PHOENIX conveyor belts apart. PHOENIX developed a customized steel cord belt for this project that met all of the client's specific requirements. Since the material conveyed was not expected to cause any specific concerns, the belt was designed with 6 mm by 4 mm covers. Due to new developments in our compounding and manufacturing technology, the zinc-plated cords were completely filled with special core rubber to maximize carcass life.

The fact that the belts are still in service today is a testimony to the belts' extreme longevity. First installed in the early 1970's the belts are still in operation almost 40 years later.



Resistance

Resistance ...

Task →

Conveyor belts are exposed to massive forces and in some cases with high chemical stress. They have to be exceptionally durable and resistant to heat, cold and particularly to sharp, heavy abrasive material. Chemical exposure is especially critical in the processing of sulphide copper ore. In addition, the high demands placed by conveying copper ore, sulphuric acid is often applied, coming directly in contact with the belt itself. This creates a unique problem in that sulphuric acid is extremely corrosive, requiring belts to be replaced after a short service life.



→ Solution

PHOENIX has developed a special MVF-A cover compound for conveying copper ore treated with sulphuric acid. The MVF-A compound offers high resistance against abrasion and acid exposure. The result is that belts with MVF-A covers allow for ore treated with sulphuric acid to undergo a chemical reaction while being conveyed, eliminating an additional process. The extended belt life realized with MVF-A covers as opposed to conventional compounds, increases the economic benefits when combined with the elimination of the additional process.



Strength

Strength ...

Task →

Chile: High in the Andes approximately 200 kilometers from the capital of Santiago, millions of tons of copper ore are extracted annually from the Los Pelambres mine. The copper ore is mined at an elevation of 3200 meters above sea level and transported to the mill 1300 meters below.

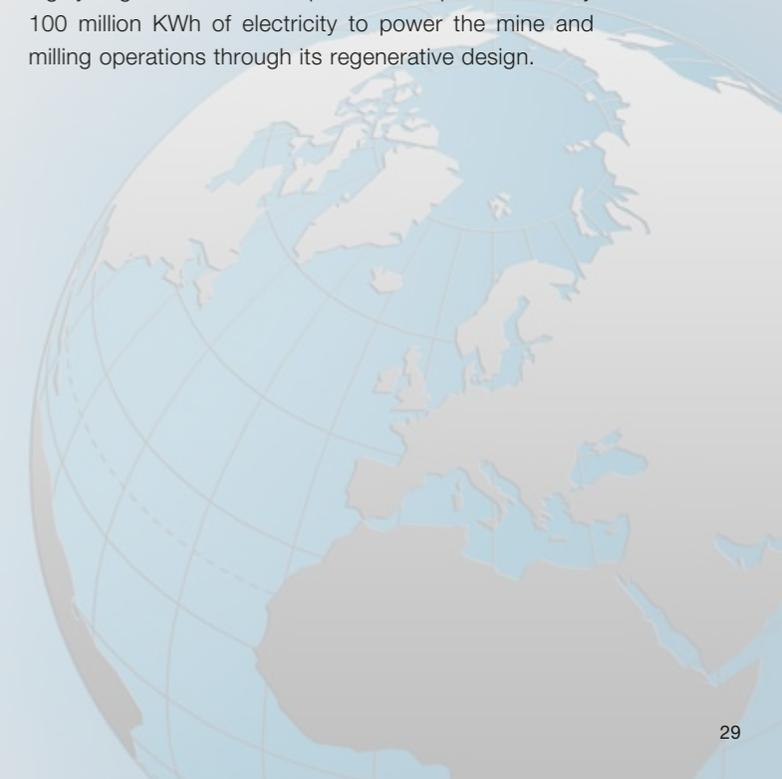
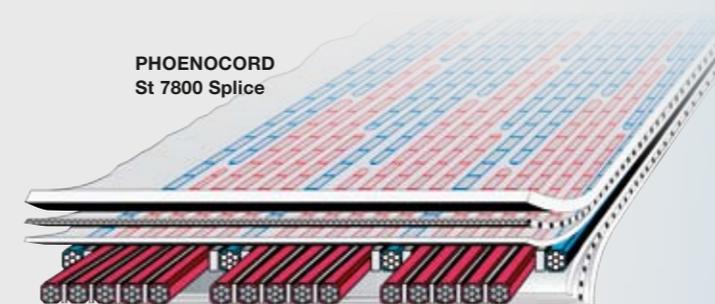
Environmental conditions are extreme. Earthquakes, dramatic fluctuations in temperature and precipitation along with severe avalanche exposure in winter require transporting the ore via conveyor 12 kilometers through a tunnel.



→ Solution

The extreme slope and capacity demanded a new belt design never achieved before. The 1300 meter decrease in elevation required the highest strength for both carcass and splices. In 1998, PHOENIX developed the PHOENOCORD St 7800, the world's strongest conveyor belt at the time and still the highest tension belt ever placed into service. The splices have a 54 % dynamic splice efficiency officially certified in accordance with DIN 22110 by the Institute of Transportation and Automation Technology at University in Hanover, Germany.

The system was designed to convey 11,000 tons per hour at a speed of 6.8 meters per second, which corresponds to an annual production rate of nearly 100 million tons. The belt is reinforced with PHOENOTEC transverse polyamide cords to provide additional protection from external damage, PHOENOCARE SL rip detection and PHOENOCARE SC splice monitoring technologies. In addition to being the strongest, most highly engineered belt ever produced, it provides nearly 100 million KWh of electricity to power the mine and milling operations through its regenerative design.



Speed

Speed ...

Task →

Germany: The world's largest lignite producer, RWE, extracts one hundred thousand tons of coal daily from its surface mines in Germany. In order to reach the coal, vast amounts of overburden are removed with the enormous excavators, and conveyed several kilometers to high speed spreaders.

Here the overburden is utilized as backfill for environmental reclamation.

→ Solution

Moving millions of cubic meters of overburden daily on spreader conveyor belts running at 15 meters per second require exceptional design and production expertise. The PHOENOCORD St 2500 is produced to specific tolerances with special core rubber and cable design to withstand the extreme flexing forces exerted by exceptionally high cycle times. Thermally stable, flame resistant, antistatic cover compounds are utilized with PHOENOTEK active belt protection to ensure optimal belt life. Engineered solutions for demanding service conditions.



Monitoring

Monitoring ...

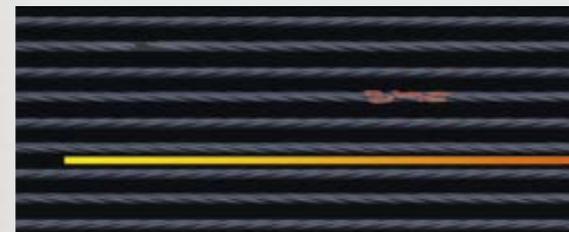
Task →

Due to the nature of bulk material conveyance, all belts are subjected to damage from a wide range of sources. It is critical to detect the magnitude of damage as early as possible to prevent further damage and minimize lost production and downtime. Physical inspections by maintenance personnel are generally time consuming, sometimes inaccurate, and in most cases not able to detect internal damage to the belt carcass. While regular physical inspections need to be a part of all preventative maintenance programs, new belt monitoring technologies are becoming available.



→ Solution

PHOENIX offers state-of-the-art systems, which effectively monitor virtually all aspects of the belt condition and operation on the system. Cover wear, cover damage, carcass damage, splice integrity, belt tracking and material build up are just some of the systems' capabilities. Immediate shutdown when predetermined parameters are exceeded, while allowing for continuous monitoring of potential problems and scheduled manual shut down for inspection. PHOENIX offers the most effective protection for your belt investment.

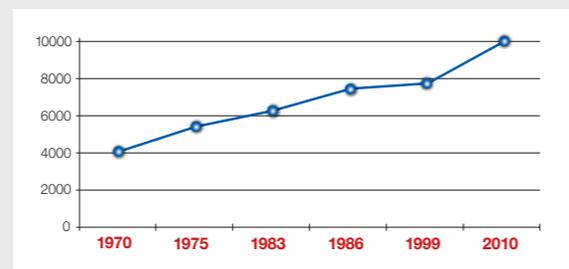


Future

Future ...

Task →

Conveyor systems are among the most efficient means of transportation. Solutions that were unthinkable just a few years ago are standard practice today thanks to new innovative research and development. This is evident in the increasing number of companies that are using belt conveyors for their logistical needs. However, the more widespread this technology becomes, the greater are the challenges. Belt conveyors are increasing the distances and volume of material that can be transported. This increases the demand for strong, efficient conveyor belts that can reliably operate 365 days per year under the most extreme operating conditions around the world.

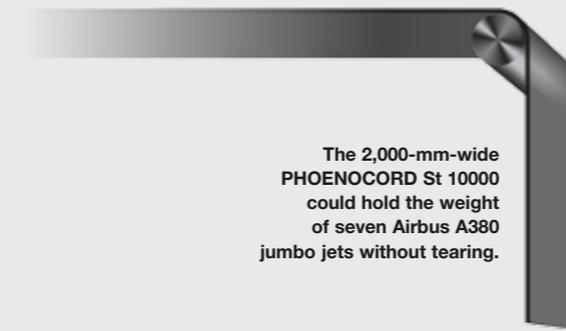


→ Solution

PHOENIX has always been the pioneer and industry leader in the development and manufacture of conveyor belts. The company is recognized worldwide as a specialist in providing customized solutions for highly complex applications. Its name is synonymous with quality, efficiency and longevity.

The PHOENOCORD St 10000 is an impressive example. The advantages in this new development is to further increase conveying distances and eliminating the need for additional transfer stations. This reduces the cost for additional drives, pulleys and other auxiliary equipment, while extending cover wear and ultimately belt life and availability.

While belt splices have always been the natural weakest point, PHOENIX has developed a splice which meets the requirements for a belt of this magnitude. The dynamic splice strength as per DIN 22110 for the PHOENOCORD St 10000 has been successfully tested at the official facility at the University of Hanover.



The 2,000-mm-wide PHOENOCORD St 10000 could hold the weight of seven Airbus A380 jumbo jets without tearing.

↓
2,000t





PHOENIX conveyor belts for all kind of applications – up to the strongest and heaviest belts ever built.

Please contact us for any assistance regarding your conveyor belt requirements.

PHOENIX Conveyor Belt Systems has the most modern testing centre worldwide for developing conveyor belts. Extensive quality tests ensure the technological lead of PHOENIX conveyor belts.

PHOENIX production locations meet the ISO 9001 quality standard and fabricate according to all the nationally relevant quality standards like DIN, SANS, MSHA, RMA, BS, AS, CSA, etc.

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