ALMEX EDITORIAL SERIES
Project: Bangladesh

START OF THE LONG BELT CONVEYOR IN INDIA

17km BANGLADESH CONVEYOR

A NOVEL APPROACH TO CHANGING THE BELT

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Limestone is transported from a mine in the Kurmi deposit across the border to the Lafarge Surma Cement Plant. The conveyor was originally constructed in 2004 and is one of the longest trans-border conveyors in the world. It covers 10 km in Bangladesh and 7 km in India. After 11 years in operation, the belt needed to be replaced, and a novel approach was used to replace the 34 km of belting.

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THE ENTIRE CONVEYOR IS RAISED 5 M ABOVE THE GROUND TO ACCOMMODATE THE ANNUAL FLOODING. THE ORIGINAL CONVEYOR SYSTEM IS 2.5 MTPA TRAVELING AT A BELT SPEED OF 4.0 M/S.

MONSOON SEASON

The Surma plant is the only clinker manufacturing plant in Bangladesh. The Indian portion of the site is very close to the highest rainfall areas in the world. The monsoon duration is from May to September with an average monthly rainfall of 1.5 m to 2 m and the maximum rainfall in a day is around 500 mm. The entire conveyor is raised 5 m above the ground to accommodate the annual flooding. The original annual tonnage for the conveyor system is 2.5 MTPA traveling at a belt speed of 4.0 m/s.

THE BIG PULL

The original ST 2500 steel cord belt was supplied by Phoenix in 300 m rolls to the Meghalaya site and 500 m rolls to the Bangladesh site. 100 splices were required and 80 days

work. To maintain the required cement production at the clinker plant 80 days of downtime to replace the conveyor was not an option.

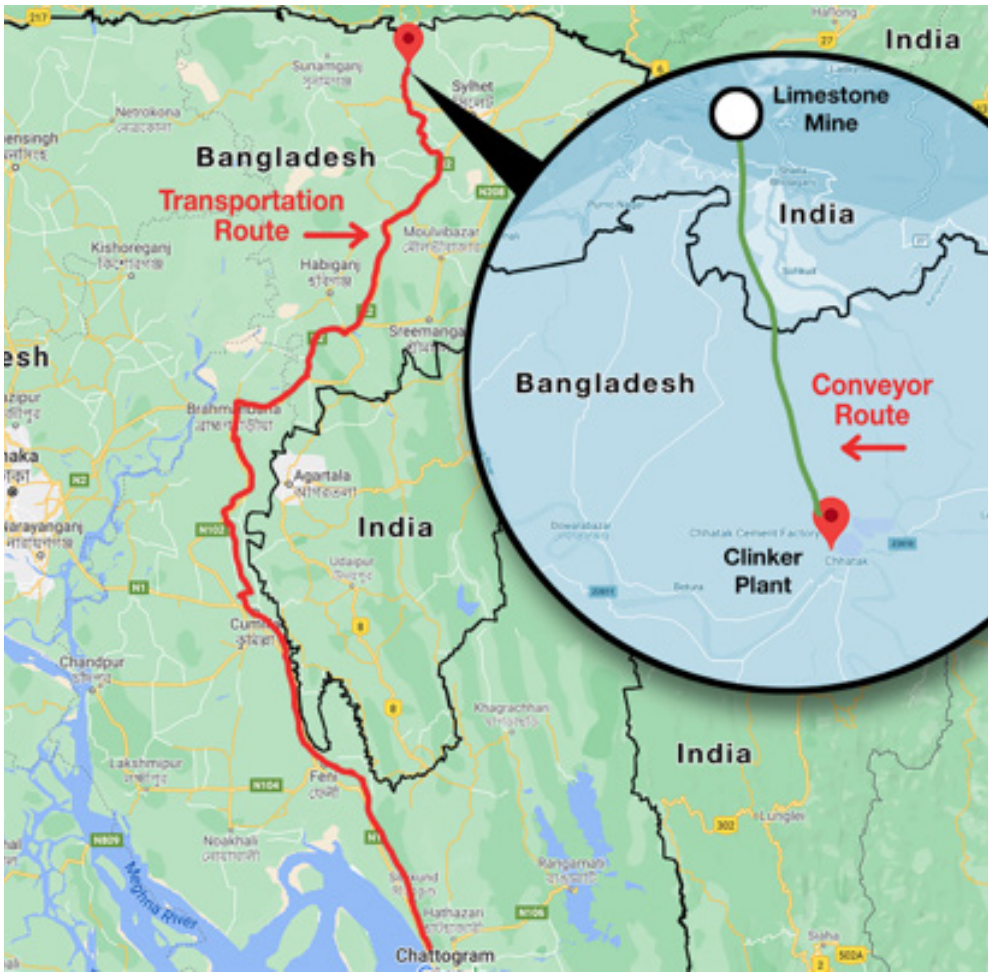
Several methodologies for changing out the belt were evaluated. The conveyor has 7 horizontal curves with radii ranging from 4,000 to 30,000 m. There are also belt turnovers at both the head and tail of the conveyor. There was a concern about the impact of any tension variations.

The entire belt was changed from only the head end in Bangladesh. The option of using the existing conveyor drives to assist with pulling the belt was dismissed due to the risk of damage which would leave the conveyor inoperable.

Almex Group proposed a plan to pre-splice and flake out 12 km of belting at the head end of the conveyor. This work would be done while the conveyor was in normal operation, and not impact production. The conveyor would then be stopped, the new belt spliced to the old belt, and using powerful belt winders, 12 km of old belting would be removed from the system as the new belt was pulled on in a matter of days. The other end of the new belt would then be spliced to the old belt and the conveyor returned to operation.

The initial plan was to repeat this process a total of 3 times to replace the 34 km of belting. This plan is shown in Figure 3.

The force required to pull the 34km of the belting belt during the change out was calculated as 281 kN. With two, 150 kW, powerful belt winders designed and built by Almex Group, the belt was able to be pulled at a controllable speed of 0 to 5 m/s.



RISK ASSESSMENT

A full risk assessment and safety plan was put into place for changing out

THE CONVEYOR HAS 7 HORIZONTAL CURVES WITH RADII RANGING FROM 4,000 TO 30,000 M. THERE ARE ALSO BELT TURNOVERS AT BOTH THE HEAD AND TAIL OF THE CONVEYOR.

the conveyor system. Skilled operators were required at each of the drives. The belt is pulled off the 100m to 130m long flaking piles from a relatively high tension at the start of each lap to nearly zero at the end of the lap. This causes problems as it propagates through the system reaching the powerful winders. A medium winder with 18.5 kW, configured as a booster drive, was utilized to pull the belt from the pile and keep the tension of the new belt at a constant, very low, tension.

The belt supplier, Sempertrans, was able to supply large belt rolls of 921 meters in length from their factory in Belchatow, Poland to the site, reducing the number of splices in the belt from the original 100 down to 37. However, getting the large belt rolls from the port to the site was a challenge. The belt rolls were shipped to the Chittagong port and then transported by truck the final 393 km to the cement factory located near Chhatak, Bangladesh as shown in Figure 1.

In addition to handling the racetrack reals of new belting, while changing out the conveyor belt, large rolls of old belting need to be removed from the winder, loaded on a truck to take them out of the work area, and then offloaded from the truck to permanent storage. The process was repeated every few hours as rolls of belting were removed from the system and required reliable, dedicated, high-tonnage cranes until the changeout was completed.

SPLICE WARRANTY

By providing all the equipment, supervision, and labor on the change out, Almex was able to provide a multi-year warranty on the splices. Each splice was done in an air-conditioned work area using the state-of-the-art Almex SG1 control system with pressure and temperature dataloggers monitoring the cure cycle of each splice to ensure quality as show in in Figure 4.

On completion, the belt was x-rayed to document the cord layout and check for porosity or cord movement in the splice. The added benefit is that everyone involved pays extra attention while doing the splice to make 100% sure the cord layout and spacing are exactly to the splice design.

The belt was supplied with EMSYS SmartWires spaced every 200m to protect against belt rips and a BeltGard 1 system for online monitoring of cord damage.

The first round of splicing, flaking, and pulling the belt onto the system proceeded so well that for the second round, all of the remaining 22 km of belting was spliced together and pulled onto the system. To accommodate the extra length the 3 continuous flaked piles of belting were extended to 130 m long as

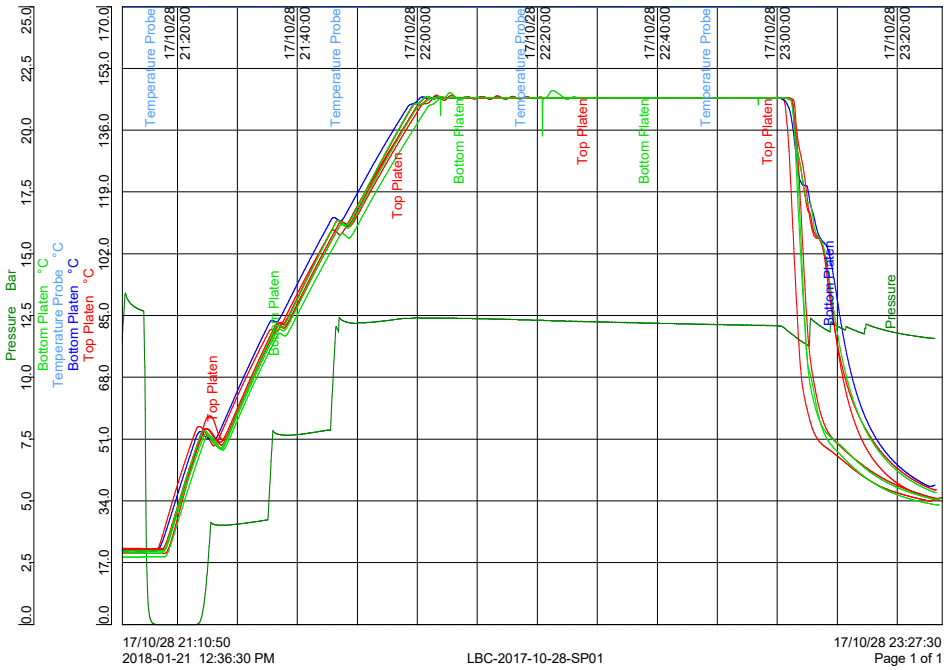


FIGURE 4.

EMSYS

FIGURE 1.

FIGURE 7.

shown in Figure 7. This eliminated the need for a third shutdown.

When starting the project there were concerns about changing such long lengths in a single shutdown. Typical system downtimes include 1-2 days for the initial splice of the new belt to the old belt, 1 to 5 days to change the entire belt. With proper planning, equipment, and onsite expertise any length conveyor can be changed out in a single shutdown. The belt was changed out in 2 phases with the project completed on April 18, 2018. "We have finished the replacement work one day ahead of the schedule." Mr. Harpal Singh

The logistics of getting the equipment, belting, and labor to the site had both expected and unexpected hurdles. In the end, the project was a success and three years later the belt and splices are still in operation without incident.

WITH PROPER PLANNING, EQUIPMENT, AND ONSITE EXPERTISE ANY LENGTH CONVEYOR CAN BE CHANGED OUT IN A SINGLE SHUTDOWN.