DOS SANTOS
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THE NO COST SOLUTION

USDA GRADE 1 TESTING

Sandwich Belt high-angle conveyors have been commercialized for nearly 40 years. During that time, units have been used to elevate various materials. When investigated anew in the late 80s, it was clear that the sandwich belt concept offered the greatest potential for a cost-effective, operationally appropriate high-angle conveying system to address the broad needs of the mining and bulk materials handling industries. They have proven both versatile and reliable in applications like ship loading, in-pit conveying, tunneling, and even pulp, paper, and biomass.

The profiles of the Sandwich Belt high-angle conveyor can conform to a wide variety of applications. At its inception, a large-scale prototype was created to test several materials from various grades of coal-to-coal refuse, coarse copper ore, excavated earth, dewatered sludge, wood chips to blast furnace, slag, gypsum, and various grains to prove the suitability of the system.

WHAT THE TESTING PROVED

With a particular interest in wood chip and grain handling, damage testing was performed on three USDA Grade 1 grains to demonstrate the gentle distribution of hugging pressure on the material in the Sandwich Belt conveyor. This test was especially significant for wood chip handling applications where chip degradation is of great concern. Five one-bushel samples were loaded onto oversized burlap sacks from each of a common batch of soybeans, wheat, and seed corn.

The first bushel of each grain was set aside to serve as the control sample, while the next four bushels were conveyed at 60 degrees, the full length of the prototype. They were tested two, four, six, and eight times respectively for corresponding conveying distances of 45.7m, 91.4m, 137.2m, and 182.9m. Samples (2.555g) from each bushel sack were then analyzed at a State of Alabama Department of Agriculture laboratory for the various forms of damage and contamination, and at the Alabama State Seed Laboratory Department of Agriculture and Industries for germination potential. The results showed no damage to any of the three grains tested, as a result of conveying in the high-angle conveyor prototype.

The test proved that conveying up to 60 degrees was very successful and indicated no limit on conveying angles of up to 90 degrees (vertical).

COST OF DEGRADED CHIP LOSS

Industry experts agree that pins and fines create a variety of operating problems and reduced yield from the digester. Additionally, pins and fines delivered to the digester can ultimately result in a small reduction of the bursting strength and tearing resistance of the paper that contains these degraded fibers.

As an example, if you use **$165.00** per ton for wood chips, and you degrade **5%** of those chips, then **$8.25** worth of the chips are degraded.

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IN A CONTINUOUS OPERATION			
$8.25 per ton	190 tons per hour	**$1567.50**	PER HOUR
$1567.50 per hour	24 hours per day	**$37,620.00**	PER DAY
$37,620.00 per day	300 days per year	**$11,286,000**	PER YEAR

Study of substantial savings realized by replacing a screened chip blowline with a Sandwich Belt conveyor system reveals a short payback period and the proposition that blowline replacement could be leased and paid for with the savings.

Cost benefit of replacing blowline with DSI Sandwich Conveyor

DSI Sandwich replaces blowline:	Elevating chips to digester
Design parameters	80 HP DSI Sandwich
Replacing:	700 HP blowline

Capital Costs for DSI Sandwich

1. Initial cost of DSI Sandwich system	
a. Engineering and supply of DSI Sandwich	$387,000
b. Additional field equipment	$39,000
2. Demolition of blowline, mods to plant	$20,000
3. Civil and foundations	$30,000
4. Installation and startup of DSI Sandwich	$127,000
5. Lost production due to plant shutdown	Installed during annual shutdown
Total Capital Cost for DSI Sandwich System	**$603,000**

Savings with the DSI Sandwich

1. Power savings: 620 HP @ $300/HP-yr	$15,500/month
2. Operating savings	No difference/month
3. Maintenance savings	$645/month
4. Chip quality preservation	$8,726/month
5. Savings in improved plant availability	$6,545/month
Monthly savings with the DSI Sandwich	**$31,416**/month

Savings applied to pay for DSI Sandwich	**$30,000**/month
For a period of	22.1 months
At an interest rate of	10%

After the leasing period, upon full payment, the mill will take ownership of the conveyor and will keep the savings in reduced operating and maintenance cost for the long life of the system.