



# DOS SANTOS SANDWICH BELT HIGH ANGLE CONVEYOR TECHNOLOGY

## FREQUENTLY ASKED QUESTIONS

### 1. Is this a new technology?

No, the sandwich belt high angle conveyor is not a new technology. In fact, the actual development of the sandwich belt high angle conveyor technology by J.A. Dos Santos, founder of Dos Santos International, occurred between 1979 and 1982. During this period Dos Santos developed several variations of the system including the Sandwich Belt High Angle Conveyor and a mechanically pressed system using fully equalized pressure rolls. The former, the preferred system, was submitted to the patent office in 1980. From 1982 to 1997, he refined the latter concept into the HAC® and was awarded three USA and foreign patents on the system. J.A. Dos Santos is the author of all of the design standards for this system and has published extensively on the subject. He had installed more than eighty commercial systems by 1997.

Since the founding of DSI in 1997, many DSI Sandwich Belt High Angle Conveyors have been supplied across a wide range of industries. This installation list continues to grow.

### 2. Why is the DSI Sandwich Belt High Angle Conveyor better than other high angle conveying methods (i.e. bucket elevators, cleated belts and pocket belts)?

When challenged by a potential customer with the argument that the later conveying elevating systems are just as capable, it's important to know the advantages of the DSI Sandwich Belt High Angle Conveyor over these other elevating solutions.

Obviously all of these systems claim capability of conveying at high angles. Many times you will find a customer who prefers one of these alternatives because of the lower capital cost. We can advise you in the way a former bucket elevator operator advised us when asked about the DSI Sandwich Belt High Angle Conveyor. Simply put, **"You can pay me now or pay me later."** While often these other elevating systems may be lower in capital cost, the lists below will prove their increased cost over the long term of the installation.

#### Molded Cleat Belts

- The cleats will wear more rapidly than the standard smooth top cover of the sandwich belt, and the cleated belt may lose its inclined conveying capabilities.
- At high belt speeds, as the cleats pass over the return rollers, vibrations can occur that cause accelerated cleat wear and a reduction in return roll bearing life.



- The cleated belt is more difficult to clean than standard conveyor belt. Belt brushes, belt beaters, air blasters, water sprays or a wash box belt cleaner must be used.
- Molded cleat belts are usually restricted to short conveyors where few or no return idlers are needed and either the material does not stick to the surface or where material carry back is acceptable.

#### **Pocket Belts**

- The pocket belt is more expensive than standard conveyor belting.
- Lump size is somewhat limited particularly at high angles of incline as the pocket belt capacity is determined by the profile of the pocket.
- Sidewalls and cleats are susceptible to damage.
- Belt training must be maintained accurately to reduce damage to the sidewalls.
- The belt is more difficult to clean than standard conveyor belts. Belt beaters, air knives, water sprays or a wash trough must be used.

#### **Bucket Elevators**

- Carry back and spillage.
- Lower capacity and increased power consumption.
- High wear and noise level.
- High maintenance and specialty replacement parts.

#### **DSI Sandwich Belt High Angle Conveyor Advantages over the others**

- Unlimited conveying capacity
- A system suitable for the most rugged mine applications, yet gentle on sensitive and friable materials.
- High availability and low operating and maintenance cost.
- Smooth surfaced belts allow continuous belt cleaning by scrapers and plows.
- Facilitates intermediate material discharge by belt plows, as appropriate, before and/or beyond the sandwiched part of the snaking profile.
- All conventional conveyor hardware ensures economy and fast delivery of replacement parts.

### **3. Is the Sandwich Belt High Angle Conveyor high maintenance?**

No, the DSI Sandwich Belt High Angle Conveyor is very low maintenance, requiring the same or less effort than conventional conveyors operating in the same capacity. At several of the units we've visited in the past, plant managers and those working directly with the conveyor system say the same thing. Plant operators have advised that they wish they had Sandwich Belt High Angle Conveyors all over their plant, as the frequency of maintenance on the other conveyors were more likely to cause production losses.



Finally, the DSI Sandwich Belt High Angle Conveyor is made up of all conventional conveyor parts, so it ensures economy and fast delivery of replacement parts.

#### 4. How does the DSI Sandwich Belt High Angle Conveyor work?

You'd be surprised at the astonished looks we've received at a start up of a DSI Sandwich Belt High Angle Conveyor, or the many questions even fabricators will ask, including "How is this conveyor system going to work?" Seeing is believing, and often times, these doubters become a great promoters for the product, testifying to the success and reliability of the DSI Sandwich Belt High Angle Conveyor.

A sandwich belt conveyor uses two conveyor belts, face-to-face, to gently but firmly contain the product being carried, hence making steep incline and even vertical-lift runs easily achievable. The DSI Snake hugs the bulk materials by the use of radial pressure which is due to the belt tension and the alternating curving profile geometry. Materials are conveyed along the convex curves in a "snaking" profile as they are elevated to the highest of angles.

#### 5. Is the Sandwich Belt High Angle Conveyor the same as the HAC®?

The HAC® technology is built from the same basis as the Sandwich Belt Conveyor (see Point 1 above.) Other forms of high angle conveying (pocket belts, bucket elevators, etc.) are not often regarded as real competitors to the Sandwich Belt High Angle Conveyor, due to their lack of capabilities as compared to the Sandwich Belt High Angle Conveyor (see Point 2 above.) On the other hand, the HAC®, which was developed by J.A. Dos Santos employs the same inherent technology, with one primary difference. The full story follows:

##### Background

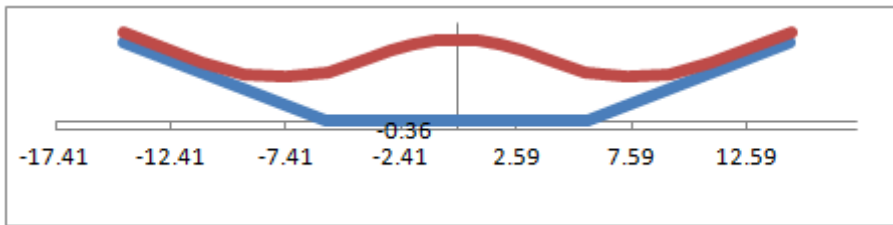
The actual development of the Sandwich belt high angle conveyor technology by J.A. Dos Santos occurred between 1979 and 1982. During this time, Dos Santos developed several variations of the system including the Snake Sandwich High Angle Conveyor and a mechanically pressed system using fully equalized pressure rolls. The former, the preferred system, was submitted to the patent office in 1980. In 1982, J.A. Dos Santos joined Continental Conveyor of Winfield, Alabama USA (now Joy Global.) During the period 1982 to 1997, he refined the mechanically pressed concept into the HAC® and was awarded three USA and foreign patents on the system. The difference between the DSI Sandwich Belt High Angle Conveyor and HAC® is that the HAC® employs special pressing mechanisms with fully equalized pressing rolls, to hug the material as its being elevated. The DSI Sandwich Belt High Angle Conveyor technology conveys materials along a series of alternating convex curves, developing radial hugging pressure through tension. The HAC® remains a successful elevating system and DSI also offers our advanced version of the HAC®, which we have dubbed the GPS, or Gently Pressed Sandwich. **The key point to remember is the J.A. Dos Santos, founder of Dos Santos International is the developer of the Sandwich Belt High Angle Conveyor and the HAC®/GPS.** He is the mind behind the machine, and he has imparted his expertise onto

all DSI personnel, making DSI the unparalleled leader in all forms of sandwich belt high angle conveying. **No one on earth knows these conveying systems better.**

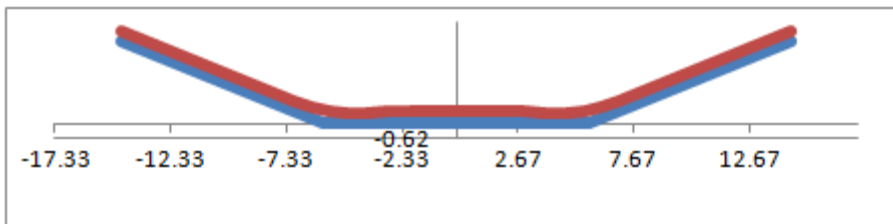
**6. Can the DSI Sandwich Belt High Angle conveyor contain fine materials below 1" particle size?**

We get this question often. The following should clarify how the DSI Sandwich Belt High Angle Conveyor can handle material in all ranges of size up to the design lump size.

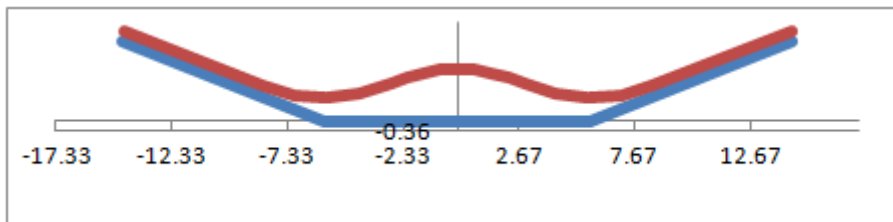
When loaded, the sandwich cross section will look something like the following:



As material is depleted from the system, or when starting up with a trickle of material, the outer belt (red) will be collapsed onto the inner belt (blue) as shown below:



The radial pressure due to tension in the belt causes the outer belt to hug firmly to the inner belt when no material is present. Any material that is present in the sandwich will open the sandwich by only the amount necessary for it to be gently hugged through the conveyor path. For instance, a half load of material looks like:



Small material is definitely not a concern for the DSI Sandwich Belt High Angle Conveyor. One of our installations in Cartagena, Spain handled very small sulphur material. (<http://www.dossantosintl.com/instls.htm#cartagena>).

You can see the material that we were running on that unit in the image attached. For scale, the idler is a 4" roll on a conventional conveyor that was running nearby.



## 7. What else does Dos Santos International do?

While we promote our high angle conveyors most prominently, we also are very experienced throughout the materials handling field. In fact, we have developed a number of studies for mine expansions and new projects. Our primary focus in these studies has typically been conveying, but we have also offered input on storage arrangements and ship-loading dock layouts. Further, we remain busy offering our *ExConTec* analysis for plant and overland conveyors. This software allows us to offer full static and rigid body dynamic analysis of the most complex conveyor systems, and thereby optimize design of a new conveyor, or rectify problem points on existing conveyors. Dos Santos International has engineered and supplied horizontally curving overland systems and mobile ship loaders. Dos Santos International offers over 30 years in materials handling and general consulting services.

Please contact us with any applications you may have and we will be happy to provide you with a budget quote and our engineering expertise for your latest project.



Thank you for considering Dos Santos International.