



## Everything is Bigger in Texas! Including PFlow Vertical Reciprocating Conveyors

### Features and Benefits

An unusually wide PFlow Industries Series M, mechanical two-post VRC lifts delicate, desiccant filled channels on a 24' long cart.

### Industry Group:

Vertical Reciprocating Conveyors

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Brady Hallock - Cardinal IG maintenance manager in Waxahachie.



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The applications for dual pane, insulated glass windows are as diverse as the sizes and shapes in which they are made.

No matter the use, the insulating performance is only as good as the seal between the two panes. Any sort of imperfection allows air to seep in, leading to foggy windows, reduced heat transfer barriers and expensive replacements.

The Cardinal IG unit of Cardinal Glass Industries recently expanded its insulated glass window operation in Waxahachie, Texas, to increase its production capacity, including that of the channels that separate and seal the two panes.

The stainless steel spacer channels are hollow and come in sticks 284" (23'-8") long. In the newly configured Cardinal IG production operation, the channels are filled with moisture preventing desiccant on the ground floor. Once filled, they are transported to the second level where they are cut and bent to the necessary lengths for each window.

### Unusually wide VRC

An unusually wide PFlow Industries Series M, mechanical two-post vertical reciprocating conveyor (VRC) is integral to the new process. It lifts the delicate, desiccant filled channels from the ground floor to the second floor on a 24' long cart.

On the second floor individual channels are fitted to the exact dimensions of the outer edges of a particular window.

This forms a frame that creates a thin space between the two glass panes as they are joined, or sandwiched together.

Prior to the plant expansion, Cardinal filled the channels on the same second floor where the windows are assembled. A forklift with a 17' extension lifted the channels to the second level. Though somewhat cumbersome, the process was sufficient to lift the unfilled channels. With the new plan to fill the channels prior to transport to the second floor, a safer, more secure lifting method was needed.

Based on its experience with successful PFlow VRC installations at other facilities, Cardinal approached the Dallas office of Precision Warehouse Design (PWD). PWD is a material handling equipment dealer with significant experience with PFlow and in specifying and installing VRCs. PFlow and PWD representatives visited the site, reviewed the options and began crafting a plan.

"There are PFlow lifts all over Texas, and I can't think of one that has carriage dimensions like this. It posed a lot of challenges, not the least of which was adapting the Series M lift for this application," said Joe Jackson, the PWD manager on the project. "The level of customization needed to design and build this lift shortened the list of manufacturers who could do the job."

In order to handle the 24' long channel carts, plus allow room for fork lift access and channels that slightly overhang the cart, the VCR needed at least a 26' usable carriage width. VRCs with one carriage dimension longer than 12' typically require a four-post lift design with four lifting chains to adequately support the carriage and ensure safe, stable travel of what is usually a heavy load. The other requirements of the Cardinal lift – a carriage length of only 5' and a total lifting capacity under 10,000 lb – were more befitting of a mechanical two-post lift.

Faced also with limited space in the balcony bay area where the lift was to be installed, a four-post lift with an inherently larger footprint would be an extremely tight fit. PFlow and PWD determined that a two-post design, with the guide posts straddling each of the 5' sides would be structurally sound. One significant hurdle remained.

#### **Minimal deflection required**

With the unusually large carriage width of 26', the use of a standard two-post design would cause the carriage platform to be susceptible to deflection. The carriage structure would need to be designed to prevent the carriage platform from sagging in the middle under its own weight.

To complicate the problem, the carriage needed to ship in two pieces to fit in the building.

### **Solution**

Using Finite Element Analysis and designing with a strength ratio of 3:1 over yield, Pflow engineered the carriage using both materials and structural shapes that would prevent any deflection no matter where loads were placed.

PFlow built the carriage halves with interlocking tongue and grooves, which worked to stiffen the carriage when bolted and welded together onsite. Rather than one continuous piece, the platform is two pieces with a sturdy reinforcement in the middle.

### **Single panel, Power Slide Gate**

The gates on each floor are also unique. On the ground floor is a 26' wide, single panel powered vertical-slide gate that opens and closes with the push of a button. On the second floor is a double panel, horizontal sliding gate that acts as a climate barrier. It is designed to keep the dust and air conditioning from the desiccant filling station on the ground floor from migrating to the channel bending area on the second floor. Both gates include an electro-mechanical interlock system for additional safety.

"We are very happy with the lift. It is safe and has allowed us to move the channel prep area to the first floor, providing seamless transport to the second floor bending and assembly area," said Brady Hallock, the Cardinal IG maintenance manager in Waxahachie. "I know there are similar lifts at other Cardinal plants, but this is the biggest. Everything is bigger in Texas!"

The carriage has dimensions of 26'-6" wide x 5' long, with a 7' load height. It has a gross lifting capacity of 9600 lb, capable of moving a 3500 lb live load, plus the 5500 lb carriage and 600 lb of chains. It moves at a speed of 25' per minute over the 17' travel distance between the ground floor and second floor balcony.

The VRC was installed in February 2014. Periodically, it is also used to move equipment and supplies between the two levels. Forklifts are now used just to load the channel carts on the lift and to move other materials throughout the facility.

Vertical lifts have their own national safety code (ASME B20.1). PFlow has over 16,000 proven vertical lift installations worldwide.



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