

The Benefits of Horizontal Motion Conveying Bulk Products

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Nearly a century ago, horizontal motion conveyors began making an appearance in the mining industry. As early as the 1930's, companies such as Overstrom and Sons (which would eventually become Triple/S Dynamics) were manufacturing drives that generated a slow-advance/quick-return motion. These devices would become the basis for today's horizontal motion conveyors. Also known as "differential motion" conveyors, these early machines employed complicated drives involving cams, gears, and rotating elements, all of which negatively impacted their overall reliability.

A breakthrough in horizontal motion conveying was achieved in 1974, when Triple/S Dynamics engineered a whole new drive utilizing rotating unbalanced elements. This new design delivered the same slow-advance/quick-return motion of the earlier drives, but with the added benefit of mechanical simplicity and inertial balance. When attached to a horizontal trough, this dependable new drive opened the door for a wide range of applications for horizontal motion conveyors.

The Slow-Advance/Quick-Return Advantage

The key to horizontal motion conveying is the action of the conveyor upon the inertia of the conveyed materials. During the slow advance of the conveyor's cycle, material is at a relative rest on the conveying surface. The quick return segment of the cycle gently slides the conveying surface under the material bed. Repeating this cycle 200 - 300 times per minute serves to smoothly convey the material up to forty feet per minute along the length of the conveying surface.

This horizontal motion conveyor design offers a number of advantages over conventional vibrating conveyors, screw conveyors, and drag conveyors often used in bulk handling applications. Compared to conventional vibrating conveyors, which are usually powered by springs and convey material through the impact on the conveyed material, the horizontal motion conveyor provides gentle transportation. Fragile materials like food products, agglomerated powders, and extruded, flaked, or pelletized products are undamaged and remain intact during the conveying process.

At the same time, the horizontal motion conveyor offers a much higher level of mechanical simplicity than either screw or drag conveyors. The result is a more durable conveying system that also requires significantly less maintenance. In addition, with no chains, screws, sprockets, rollers, idlers, or other moving parts located outside of the sealed and guarded drive unit, the horizontal motion conveyor is intrinsically safer for operating and maintenance personnel.

For materials that require transportation without compaction or segregation, the horizontal motion conveyor provides an ideal system. The “en masse” conveying method provided by the horizontal motion assures that mixtures will be delivered as originally blended, and fine particles will remain evenly distributed throughout the entire product bed.

Based on its unique design that features a self-contained drive unit that has no outbound moving parts, the horizontal motion conveyor is virtually maintenance-free. And based on its relatively slow rotational speed, a typical drive unit will usually deliver more than ten years of life between service intervals, with only periodic lubrication required. Finally, since these conveyors utilize no springs or counterweights, they do not require the periodic tuning that is part of an ongoing maintenance program for conventional vibrating systems.

Versatility Where It’s Needed

When specified as a completely sealed unit and equipped with self-sealing intermediate discharge gates, a horizontal motion conveyor can deliver safe, dust-free operation – even in applications calling for multiple intermediate discharge locations. Problems with caustic or abrasive materials are eliminated, since the conveyed material is never in contact with the conveying system’s moving parts. And based on the inherent self-cleaning nature of these horizontal motion conveyors, they can readily accommodate applications handling more than one material.

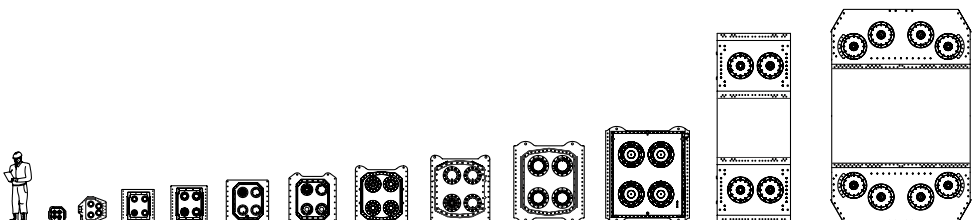


Figure 1. The Slipstick drive units are available in a wide range of sizes.

Base mounted on the floor or suspended overhead, horizontal motion conveyors provide the level of versatility required for difficult installation applications. Conveyor drives may be positioned at either end of the conveyor, or mounted above or below. In addition, these conveyors can be operated at variable speeds, and their conveying direction is reversible. Conveying surfaces may be carbon, stainless, or abrasion resistant steel, as well as polyethylene plastic, or titanium. Matching these benefits is the horizontal motion conveyor's broad range of drive sizes and material handling capabilities. Single drive units large enough to power a 8 by 6 feet by 150 feet long conveyor trough are available. Figures 2 and 3 detail the performance specifications for the various drive sizes.

Figure 2.

Drive Width (ft.)*	Total Wr (Lbs-in)	Stroke	Net Driven Mass excluding weight stack	Height "H" (Inches)	Length "L" (Inches)	Width "W" (Inches)
4/1.1	101	1.000	120	15.750	17.500	20.000
6/1.7	752	1.000	1192	25.625	26.750	27.875
8m/1.5	406	1.000	572	26.188	28.188	25.438
8m/2	624	1.000	905	26.188	28.188	31.438
8m/2.5	754	1.000	1063	26.188	28.188	37.438
8/2	1326	1.000	2094	33.500	33.000	42.250
8/2.5	1724	1.000	2722	33.500	33.000	48.250
8/3	2122	1.000	3350	33.500	33.000	54.250
10/2.5	2514	1.000	4153	37.250	36.750	43.000
10/3	3136	1.000	5181	37.250	36.750	49.000
10/3.5	3509	1.000	5867	37.250	36.750	55.000
10/4	4090	1.000	6838	37.250	36.750	61.000
13/2.5	3704	1.000	6226	43.000	43.000	44.438
13/3	4630	1.000	7782	43.000	43.000	50.438
13/3.5	5242	1.000	8905	43.000	43.000	56.438
13/4	6115	1.000	10389	43.000	43.000	62.438
15/2.5	4794	1.000	8319	50.375	48.000	45.875
15/3	5993	1.000	10399	50.375	48.000	51.875
15/3.5	7191	1.000	12479	50.375	48.000	57.875
15/4	8390	1.000	14559	50.375	48.000	63.875
15/4.5	9329	1.000	16177	50.375	48.000	69.875
15/5	10496	1.000	18200	50.375	48.000	75.875
15/5.5	11662	1.000	20222	50.375	48.000	81.875
15H/2	7049	1.000	12420	57.250	53.000	40.188
15H/3	11748	1.000	20701	57.250	53.000	52.188
24H/4	24729	1.000	44614	65.250	60.000	69.125
24H/5	28835	1.000	52412	65.250	60.000	81.125
24H/6	33949	1.000	61790	65.250	60.000	93.125
32/5	41738	1.000	77030	82.250	71.500	93.625
32/6	50522	1.000	93364	82.250	71.500	105.625
32/7	60460	1.000	111731	82.250	71.500	117.625
32/8	70399	1.000	130097	82.250	71.500	129.625
40H/6	98289	1.000	184455	100.000	85.000	110.625
40H/7	117625	1.000	220741	100.000	85.000	122.625
40H/8	136960	1.000	257026	100.000	85.000	134.625
40H/9	154685	1.000	290289	100.000	85.000	146.625
40HS/8	135349	1.000	253915	143.563	84.688	variable
40HS/9	154685	1.000	290290	143.563	84.688	variable
408HS/8	270698	1.000	524613	147.688	147.000	variable
408HS/9	309370	1.000	599660	147.688	147.000	variable

*TSD drive designation

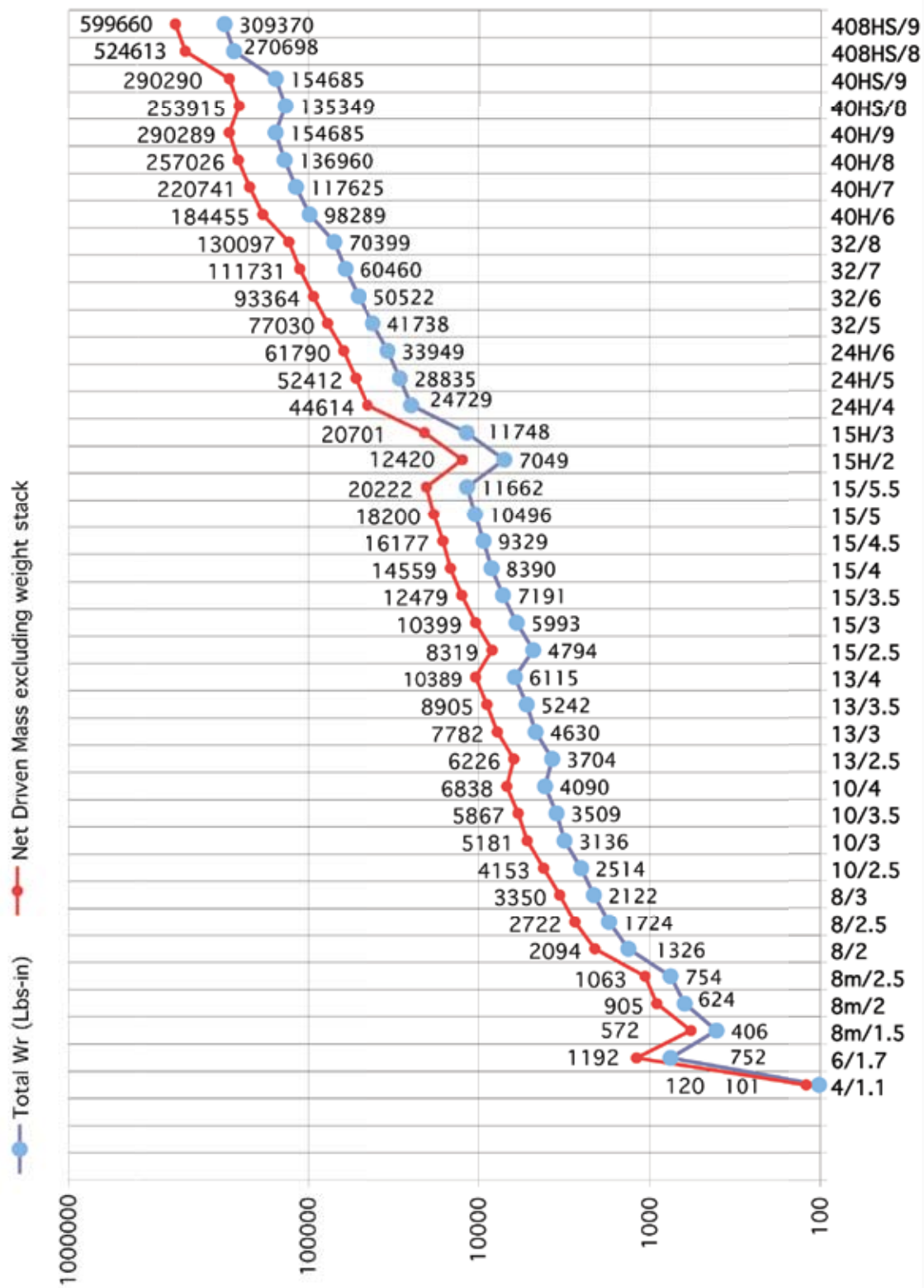


Figure 3. Performance specifications for various drive sizes

Extensive Conveying Applications

Based on its many advantages over conventional vibratory conveyors, the horizontal motion conveyor is increasingly being utilized in a wide range of powder and bulk handling applications. There are a number of demanding applications where the special attributes of the horizontal motion conveyor can be significant including:

Carbon black: the gentle conveying action of the horizontal motion conveyor reduces product fines attrition, while its self-scrubbing action retards the accumulation of sticky materials to the contact surfaces of the conveyor.

Crushed ores: the combination of abrasion-resistant pans, the ability to accommodate large, heavy volumes, and thorough dust containment characteristics make horizontal motion conveyors a practical choice for this demanding application.

High temperature materials: with no springs to fail, the horizontal motion conveyor can operate in a wide range of extreme temperatures. In certain applications, air or water cooling systems have been used with horizontal motion conveyors to reliably handle materials up to 1700°F.

Pharmaceuticals: because the horizontal motion of these conveyors naturally eliminates product sticking and the creation of fines and other residual materials, they are ideally suited to meeting the most demanding requirements of sanitation and cleanability.

Hazardous or toxic materials: based on the total isolation of conveyed material that can be achieved with enclosed horizontal motion tube conveyors, hazardous and/or toxic materials can be transported without fear of escaping fugitive dust.

In Summary

Durable, effective, easy-to-maintain, safe, clean, and applicable to a wide range of bulk handling uses, the horizontal motion conveyor has long been a valuable tool in conveying even the most problematic of bulk materials. And as knowledge of its versatility, benefits, and proven track record spreads within the industry, many more uses will be discovered for this unique conveyor design.

About the Author

Jay Sullivan is the president of Triple/S Dynamics, a manufacturer of specialized conveying and material separation equipment for food, chemical, agricultural, mining, recycling, and related materials processing industries. Mr. Sullivan is a graduate of the University of Texas, with a BS degree in Mechanical Engineering. Having been involved in the design and application of conveying equipment and systems for more than twenty years, Mr. Sullivan is recognized as an industry expert in horizontal motion conveying. For more information call 800-527-2116, email jay@sssdynamics.com, or visit <http://www.sssdynamics.com>.

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