

APPLICATION REVIEW

Francis Manufacturing Co.

Aluminum Foundry Automates Transfer Process with a Dependable, Heavy-Duty, Single Strand Top Carry Drag Chain Conveyor

Manually shoveling sand to fill cope and drag boxes (casting flask) for sand casting is a physically demanding process for mold makers, who on average shovel 20 tons of casting sand weighing 100 lbs. per cubic foot into 70-80 molds per day. This demanding operating condition creates a high level of physical strain on the mold maker's body. The result of this strain was a multi-million-dollar-per-year workers compensation obligation for an aluminum foundry. The financial impact not only hit the company's bottom line but slowed overall worker efficiency. Company leaders knew that keeping workers safe and healthy was not only important for their people and profits but also for their customers. They knew if they could improve productivity through process improvements, they could reduce lead times and improve customer satisfaction, which in turn would continue to grow their business. After many searches on Google and conversations with various material-handling companies, foundry management discovered Hapman.



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Effectively and reliably moving foundry sand is a challenge. The sand carries a high-moisture content and does not move easily when conveyed. Initially the foundry tried a Helix® Flexible Screw Conveyor; however, even with modifications and flow aids, the right combination of auger type and speed could not be achieved to move the sand. After numerous discussions, site visits and extensive material testing, it was clear the solution to this material-handling challenge would be a conveyor engineered



Drag Chain Conveyor engineered to efficiently and reliably move and meter the foundry sand into casting flasks.

to fit the exact requirements of the application.

Manual Labor Eliminated

The result of the testing and trials was a Single Strand Top Carry Drag Chain Conveyor with integral hopper. The engineered material-handling assembly allowed front-end loaders to empty foundry sand into the hopper as the drag conveyor reliably metered the sand into the molds. This process eliminated the need for the slow, back-breaking process of manually shoveling sand into molds.

The redesigned mold-filling process begins as prepared moist foundry sand is introduced into the hopper by a small skid steer loader. The dense material is screened as it enters the hopper to eliminate aluminum tramp metals or larger pieces from entering the process. To provide consistent material flow to the conveyor, the hopper is constructed with an electro-polished stainless steel finish, a pin-style agitator, and a vibrator to keep material from bridging. The drag chain moves the sand in a consistent, metered flow to the discharge point where the mold maker controls the

filling of the casting flask.

The Hapman Drag Chain Conveyor features a design that offers minimal maintenance requirements and abrasion-resistant construction. The Hapman drag chain is engineered in a CrMn alloy and drop-forged construction. The chain is machined, carburized and case-hardened for strength and durability. The bolted UHMW polyurethane flight design reduces the possibility of sand sticking on the flights while also resisting wear and providing a quiet operation.

Increased Production, Lower Operating Costs

The foundry started with one Hapman Drag Chain Conveyor and was so pleased with its performance that it added 14 more. Now all of the foundry's mold-filling lines feature a Hapman Drag Chain

Conveyor system. This has increased production capacity by more than 30 percent and resulted in a 100-percent return on investment in less than 6 months. Automating the foundry sand transfer process also significantly lowered ergonomic risk factors and eliminated the daily physical strain on mold makers, which has significantly decreased costs. Because the foundry is now able to take on more jobs and deliver shorter turnaround times, overall business has increased considerably.

Productivity Up + Injuries Down = Award

Since the initial conveyor install in 2015, results have been excellent for the foundry. Says Chris Francis, president, Francis Manufacturing, "We've seen productivity gains of 20–30% since the first install in 2015. We've added 20,000 square feet of manufacturing space and staff to support our production gains. "We also succeeded in our initial goal of getting those shovels out of our people's hands. Our injury rates have gone down significantly, and we've seen a very significant reduction in workers' compensation expenses. In fact, in 2019 we received a first-place Safety Innovation Award from The Ohio Bureau of Workers' Compensation for the improvements we've achieved with this system".

ABOUT HAPMAN

For 70 years, Hapman has provided manufacturing plants around the world with the most technologically advanced powder and bulk handling equipment and systems, offering custom engineered equipment and systems for chemical, food, pharmaceutical, plastics, building, minerals, and other industries.

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