

# KEEP MATERIAL DEGRADATION IN CHECK

A Properly Designed En-Masse Conveyor Will Minimize Material Waste, Enhance Efficiency and Increase ROI

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## INTRODUCTION

The North American industrial and manufacturing sectors represent some of the most competitive operations in the world. With the global demand for products escalating each year, these sectors continually search for new ways to innovate existing processes in order to answer the demand for higher levels of production output.

With those rising demands on production levels come increasingly complex challenges related to managing material handling and quality control. Emerging global markets are causing a dramatic increase in demand for resources, and the availability of many raw materials has become more limited. Non-food agricultural materials is just one category that is seeing increasing demand.

On average, raw material prices have increased by 117% since 2000<sup>1</sup>. This is approximately a 6% annual increase.

Experts indicate commodity prices are likely to continue to rise and will remain unstable. Higher front-end costs put extreme pressure on material movement and processing, with additional emphasis on ensuring the least amount of waste possible. With supplies of many raw materials becoming harder to secure, commodity price volatility may not be just a temporary phenomenon. It is up to industrial and manufacturing sectors to either absorb additional costs, find new ways to mitigate the expenses, or pass price increases along to customers who are already reluctant to spend.

Materials such as biomass, wood pellets, grains, and potash fertilizers are experiencing increasing demand across a growing global economy. Potash is produced worldwide at amounts exceeding 30 million metric tons (mt) per year, mostly for use in fertilizers.<sup>2</sup> Various types of fertilizer-potash constitute the single largest global industrial use of the element potassium. Mixed fertilizer manufactured in the United States in 2016 was projected to be valued at more than \$5 billion USD.<sup>3</sup>

The handling of any valuable raw material also involves the inherent cost of waste due to the breakdown of the material as it is being moved throughout the process. With the escalating demand for raw materials, the need to minimize degradation has become an essential aspect of managing a successful operation.

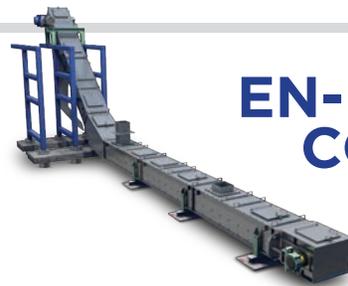
With costs for raw materials on the rise and the increasing need to reduce product waste, many manufacturers are feeling the immediate effects in their operations and bottom lines. With predicted increases in global demand, the impact of material degradation will persist and potentially get worse.



## THE CHALLENGE

Reducing material waste, or degradation, requires critical components such as conveyors to be efficient, focused on minimizing negative-impact factors, and always aligned with generating profits. For every metric ton (mt) of raw material waste that can be avoided, a company can benefit from a significant savings – and a healthier bottom line.

Degradation is defined as a loss of the relevant properties of materials, which proceeds gradually due to exposure to in-service conditions.<sup>4</sup> There are several factors that impact product degradation, including elevated temperature, friction from mechanical loading, and aggressive environments. All of these factors come into play while raw material is being processed, and they can especially impact a product that is being moved via a conveyor. These variables, as they relate to conveyor use, can impact the entire volume of material being transported, bringing about unwanted changes in the physical structure of the material as well as impacting the usable volume and overall quality.



**EN-MASSE  
CONVEYOR  
PROVIDES**

**UP  
TO 90%  
EFFICIENCY**

Maintaining product integrity from start to finish is one of the biggest challenges of handling bulk material in any industrial process. The constant particle-to-particle contact during the conveying and handling processes breaks down the product's standard condition. In addition to poor quality, material degradation also generates significant dust and dust containment challenges.

When it comes to conveyors, product degradation levels almost always come down to how a conveyor is built. Not all conveyors are created equal – nor do they equally handle every material effectively. From en-masse, paddle drag and screw conveyors to belt conveyor methods, a conveyor's design should be chosen based on its distinct functional characteristics and the materials being moved.

Choosing the wrong conveyor can mean the difference between an annual loss or a strong bottom line. Fragile materials such as hops or grains should never be treated to the same harsh conveying methods that stand up to gypsum, powdered metals or sand.

When a gentle touch is required, certain conveyors are definitely OUT of the equation:

- **Paddle-Drag Conveyor:** This conveyor uses a paddle to literally force material along the entire length of the conveyor line, which can significantly increase degradation through additional friction.
- **Screw Conveyor:** This conveyor utilizes a helix motion that constantly tumbles the material, inflicting a grinding effect at every turn which considerably escalates degradation.
- **Belt Conveyor:** These conveyors are often mistaken as being gentle on product, but the real issue is the speed of the belt, which can be moving as fast as 400 feet per minute. That high speed generates incredible impact at discharge points where the product can be easily compromised as it slams into a literal wall.

Industry pays an enormous price for material degradation. Much of that wasted material could be saved if the proper type of conveyor was chosen and designed specifically to move the intended materials. It is critical for a successful industrial or manufacturing operation to understand how using the most effective and efficient conveying methods to improve material handling can reduce direct cost.

## THE SOLUTION

Companies that take the necessary steps to increase resource productivity can produce significant immediate value while minimizing cost and establishing improved operations. The solution to material degradation lies in the adoption of a CDM Systems en-masse conveyor.

En-masse conveying is the best selection for high-volume material handling with minimal degradation. This unique method moves bulk materials smoothly, gently, and economically across planes and around bends in an abrasion-resistant steel housing. There is no internal disturbance or pressure on the material, and the load can be discharged at any opening.



### Get Efficient:

- **90%** - CDM En-Masse Conveyor
- **45-50%** - Drag Conveyor
- **45%** - Screw Conveyor
- **20-25%** - Belt Conveyor

The advantage of an en-masse conveyor is in the slow, gentle movement of product. The en-masse motion is generated by the product itself, as opposed to the product being pushed, shoved or ground up by another means along the conveyor line. A properly designed CDM en-masse conveyor can mitigate material degradation from the start. The custom process at CDM begins by understanding the unique relationship between the operation of the en-masse conveyor and the potential for mitigating degradation in the materials. With the knowledge that all conveyors are not suited for every task, especially when it comes to handling fragile and vulnerable materials, an en-masse conveyor can be designed to be a durable piece of equipment that quickly returns value to any operation.

All CDM conveyors are designed and built on a per-suit basis. This allows us to tailor the conveyor construction and materials to suit each specific application. CDM engineering and design principles are founded in the science of material movement and bulk density, the technology of optimum chain speed intersecting with acceptable chain pull, and the innovation of wear resistance and anti-corrosion techniques.



To be profitable, an operation must trust that its equipment can deliver materials in a consistent, controlled, and reliable manner. CDM partners with companies to design the correct conveyor, which guarantees it will meet the demands of any operation.

More than 40 years ago, CDM began with the premise that building the highest quality, longest-lasting conveyors for heavy-duty industrial applications starts with the chain. Our founders worked in bulk material handling industries for many years and saw the challenges of those industries as

an opportunity to deliver optimum production levels with conveyors that could meet the 24/7, aggressive demands of the applications.

CDM en-masse conveyors effectively move material from ash to zinc, operating in industrial sectors ranging from mining, energy and utilities to steel, light ore and chemicals. From a variety of chain link options to custom flight configurations, CDM covers the entire spectrum of en-masse conveying requirements. In addition to welded malleable steel flights, CDM offers materials such as stainless and abrasion-resistant steels.

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## CONCLUSION

Knowing how to prevent degradation is a critical performance factor in any material handling process. CDM engineers have created solutions for more than 2,600 different bulk powders and solids. Our engineered processes allow you to dump, fill, feed and convey singular and multiple ingredients without degrading the quality of your materials.

Whether you use batch, intermittent, or continuous flow, CDM will specify and size the right equipment to maintain your product specifications, reduce waste and improve your bottom line.

For more than 40 years, CDM has successfully designed heavy-duty conveyors to handle the toughest materials in the harshest conditions possible. Our ability to custom design each conveyor to adapt to the bulk material being handled, as well as account for the surrounding environmental impact, offers the best possible scenario for slowing corrosion's impact. Considering the steep cost of material degradation, maintenance, and unplanned downtime, it is easy to see ROI from a CDM conveyor.

**CDM delivers the best solutions to bulk material-handling problems. Our conveyors offer unmatched durability and value for even the most challenging material transfer applications.**

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## ABOUT THE AUTHOR:

Andrew Parker is Vice President for CDM Systems, Inc. He has more than 20 years of experience in the bulk material handling industry. He oversees operations including conveyor design and development.

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