KLEIN PALMER

SAND MATTERS!

Move it & mix it efficiently

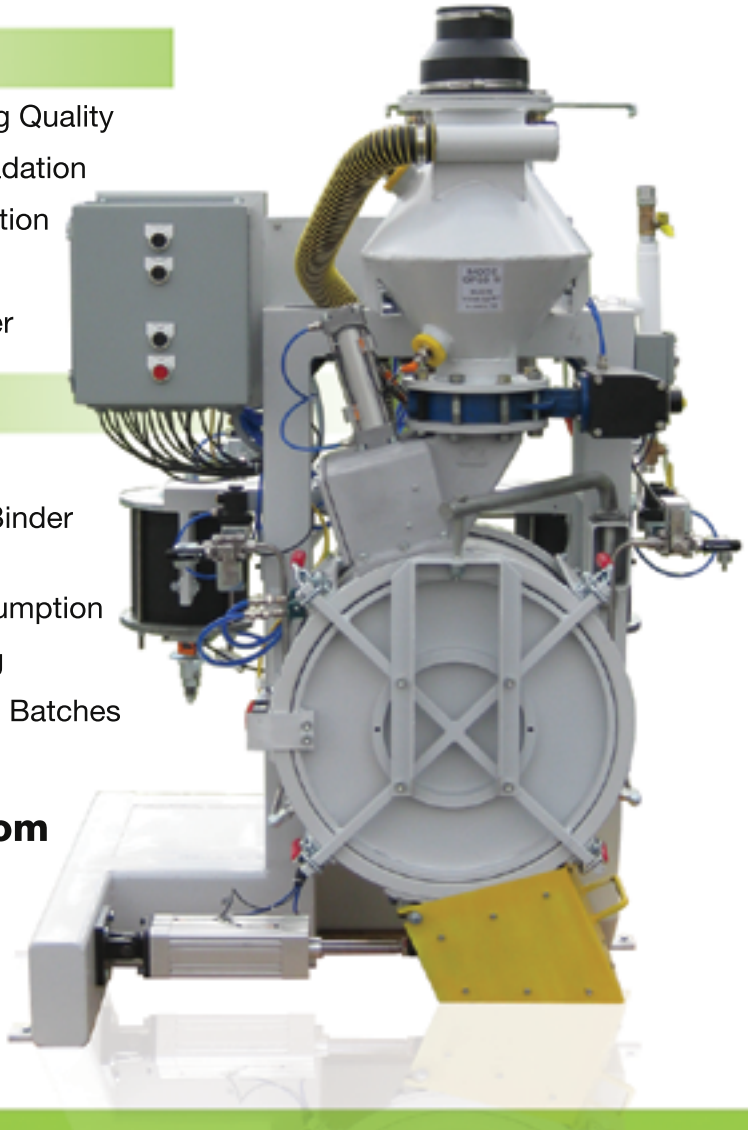
PLUG FLO® Pneumatic Transporters & STATORMIX® Core Sand Mixers

PLUG FLO®

- Improve Sand Casting Quality
- Eliminate Sand Degradation
- Reduce Air Consumption
- Minimal Maintenance
- Efficient Sand Transfer

STATORMIX®

- High Core Strength
- Accurate & Reliable Binder Dosing System
- Reduce Binder Consumption
- Wear Resistant Lining
- Easily Process Partial Batches



www.kleinpalmer.com
800.457.5456

Klein Palmer Inc., is a Palmer Manufacturing & Supply, Inc., Company.
We are Palmer's metal casting, rail sanding and industrial processing division, offering a wide variety of heavy-duty processing equipment and services.

CASE STUDY: HIGH-DENSITY PNEUMATIC SYSTEM IMPROVES COMPLEX CORE ROOM EXPANSION

JIM GAULDIN
Chief Sales Engineer
Klein Palmer Inc.

ARTICLE TAKEAWAYS:
- High-density sand conveying improves core qualities
- Lower velocities reduce sand grain degradation and pipe wear

I was working through a problem for a customer and in researching a solution I came across the following article written by Chris Doerschlag about our pneumatic transporters. While the article was written sometime in the past, it has many truths that still hold true to today. This article has been edited for space requirements.

As production expands, the core room also grows in size. In many large automotive and aerospace foundries, a common scenario unfolds: the increasing need for batch mixers positioned above each core machine to maintain optimal sand quality. This raises the question: how can each mixer be efficiently fed?

In this specific case study, the task of feeding 52 batch mixers proved to be quite challenging. Our proposed solution involved integrating 11 high-density pneumatic sand transporter systems. These systems would automatically transfer raw sand from two 100-ton bins to smaller day bins positioned above each of the 52 mixers. However, this recommendation sparked considerable debate and scrutiny. Several individuals raised valid concerns based on past experiences, highlighting potential issues such as pipeline wear and tear, sand degradation into dust, high maintenance requirements, leakage due to worn-out piping, and the resulting significant downtime.

Conventional pneumatic conveyors have been around for a long time and are well known. They operate on the dilute or dense phase method of transporting sand. The dilute and dense phase systems, however, require fluidization and high velocities of the sand in the pipeline. Higher sand velocities in turn cause higher erosion of the piping and damage the sand grains. It is not uncommon to find dilute and so-called dense phase systems with transport velocities approaching 3000 feet per minute and more.

The success of these systems depends entirely on keeping the sand in suspension at all times by installing boosters along the pipe run. Because of the excessive velocities required a portion of the material is always pulverized during transport.

The new high-density transport system in contrast, unlike conventional pneumatic conveyors, moves the sand in slugs at low velocities and does not require fluidization or boosters to move the sand. In fact, the sand is pushed in slugs through the pipeline at much lower velocities, typically 100 to 400 feet per minute.

In any foundry setting, it's essential to showcase your process rather than relying solely on drawings or animations. There's no substitute for witnessing it in action to validate the results. Following a comprehensive investigation, which involved on-site visits to other similar installations, the high-density system was successfully installed and is now operational.

Pneumatic conveyors, like many other pieces of equipment used in foundries, were initially developed for material transfer in various industries. They were originally utilized in processes involving flour, lime, clay, cement, and various powders, where material transfer through pipelines via fluidization was necessary. These processes have a long-standing history and have become standard applications for pneumatic conveyors.

Continued on next page

Directly applying this technology to foundry applications, particularly in the context of moving sand through pipelines, wasn't necessarily the most suitable approach. Sand, being highly abrasive, poses challenges when fluidized and blown through pipelines. Unlike flour or certain other powders, using sand in this manner can lead to unexpected complications.

One approach is to halt fluidization and reduce the speed of sand movement through the pipeline. This allows the sand to form slugs, which can then be propelled through the piping using compressed air.

To illustrate this concept, imagine the canisters used at a bank drive-in. Compressed air serves to push these canisters through the pipeline connecting the drive-in station with the bank teller. Similarly, in the foundry context, compressed air is utilized to propel sand slugs through the piping system.

The same principle applies to sand transport. By eliminating the need for sand fluidization during transport, you can operate at much lower velocities. This results in reduced pipe wear and minimal sand degradation. By adapting the dilute or dense phase conveying system to suit your foundry's sand application, you effectively mitigate the widespread issues commonly encountered today.

HIGH-DENSITY SYSTEM BENEFITS

- **No need for fluidization**
  - reduces air consumption
- **No boosters needed**
  - reduces air consumption and extra booster piping
- **Less pipe wear**
  - reduces repairs and leaks in the pipeline
- **Less dust generation**
  - improves housecleaning less waste material handling savings in resin as the more dust in the sand the more resin you need
- **Less compressor energy required**
  - reduces power costs
- **Minimal maintenance**
  - reduces maintenance costs and downtime

Contact:
JIM GAULDIN
jim.gauldin@palmermfg.com