Schenck Process LLC

NAATBatt International

February 2023

Contents

We are a global market leader of selected process technologies

Weighing | Feeding | Screening | Filtration | Mixing | Sifting | Milling & Grinding | Conveying | Thermal Processing | Pulverizing | Automation | Smart Solutions | Aftermarket Services

VISION

We strive to be the global leader providing world-class, sustainable products, integrated solutions and services in selected process technologies

MISSION

We make processes work to make life easier and better

About us

Technologies & services

schenck process

Material processing

Weighing

Feeding

Screening

Filtration

Mixing

Sifting

Milling & grinding

Conveying

Extrusion

Depositing

Thermal processing

Digital solutions

Software / automation

Remote service

Condition monitoring

Intelligent process control

Aftermarket capabilities

Service

Spare parts

Consumables

Refurb / modernization

About Us

Who we are in North America

AMS
Corporate HQ
Kansas City, MO

Key facts

6
technology
hubs

4
production
facilities

900+
employees

R&D ratio
of **3%**

5
innovation
centers

Quality certified
for **ISO**
9001:2015

We focus on upstream and downstream process equipment in the lithium-ion battery industry

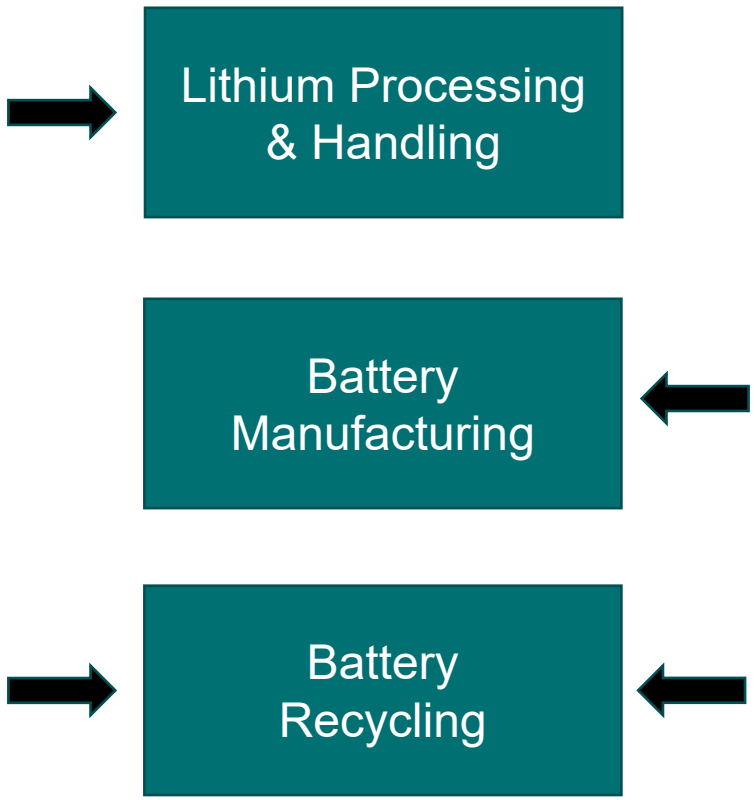
Mining / Thermal

Influencing megatrends

Arising environmental awareness arouses the need for sustainable resource management

Key applications

- Screening
- Pneumatic Conveying
- Thermal Processing
- Pulverizing
- Software / automation
- Condition monitoring



Chemicals & Performance Materials

Influencing megatrends

Future markets demand advanced, sustainable materials enabled by highly efficient and sustainable technologies

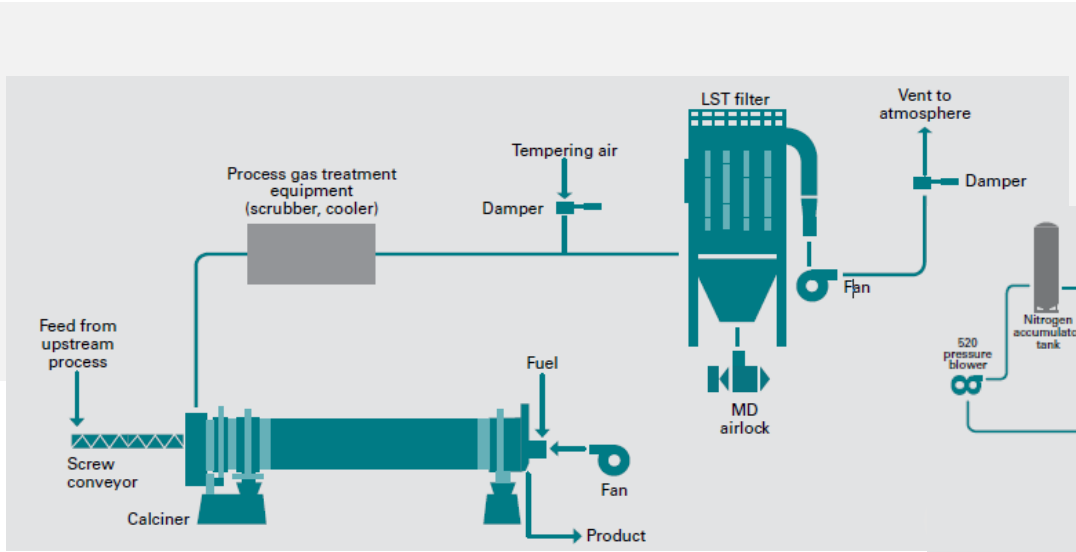
Key applications

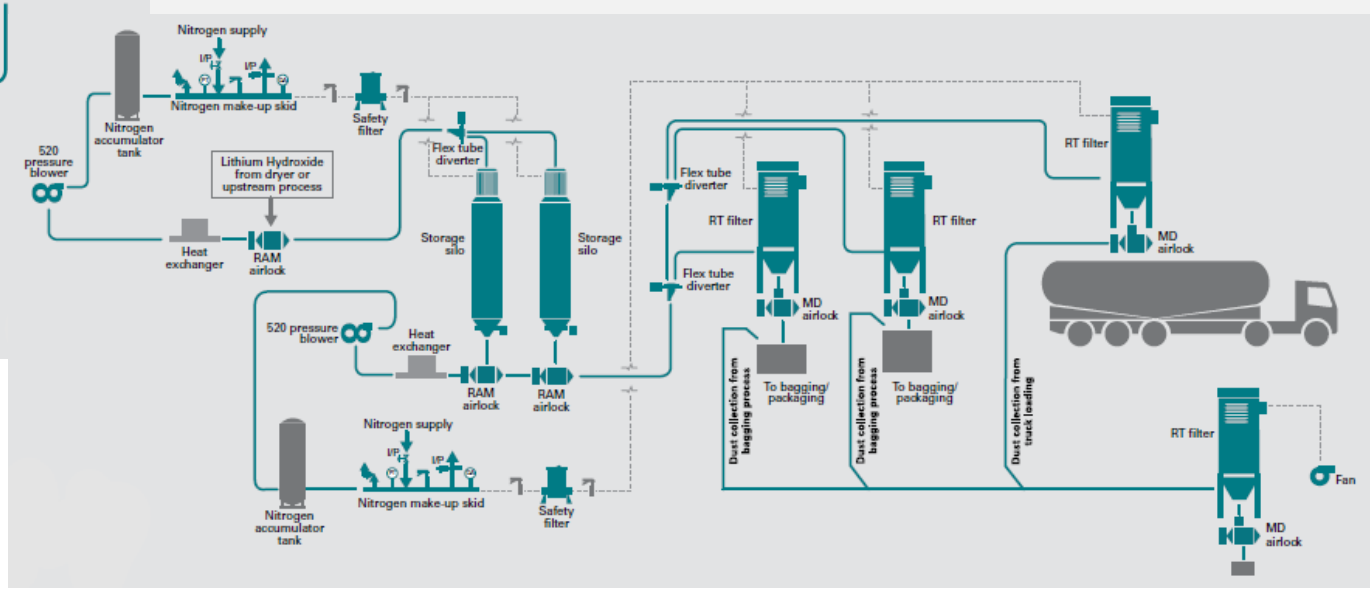
- Pneumatic Conveying
- Filtration
- Weighing & feeding
- Milling & Sifting
- Software / automation
- Condition monitoring

Contents

Lithium Processing & Handling Systems

Calcining, Drying, Filtering, & Conveying





Processing Systems

From Bartlett-Snow calciners and kilns to dryers and coolers, raw material thermal processing is handled in house.

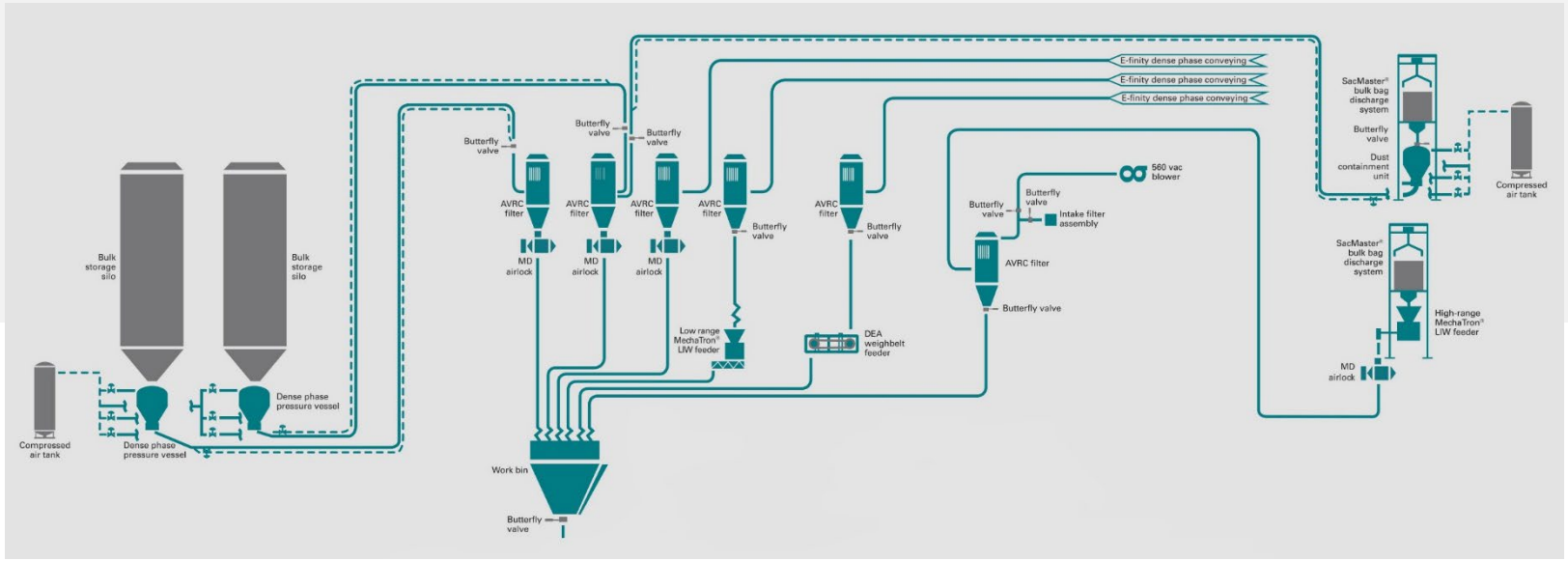
Pneumatic Conveying and Filtration

Each material has its requirements for proper transfer, so dilute and dense phase systems, both with vacuum and pressure options, are considered for each application.

Contents

Battery Manufacturing Systems

Pneumatic Conveying & Weighing/Feeding Equipment



Dense Phase Conveying Powder Feeding

As the materials are further processed and refined, so too are the systems handling those materials. Dense phase conveying is the ideal choice for pneumatic conveying, with both vacuum and pressure systems having their specific applications.

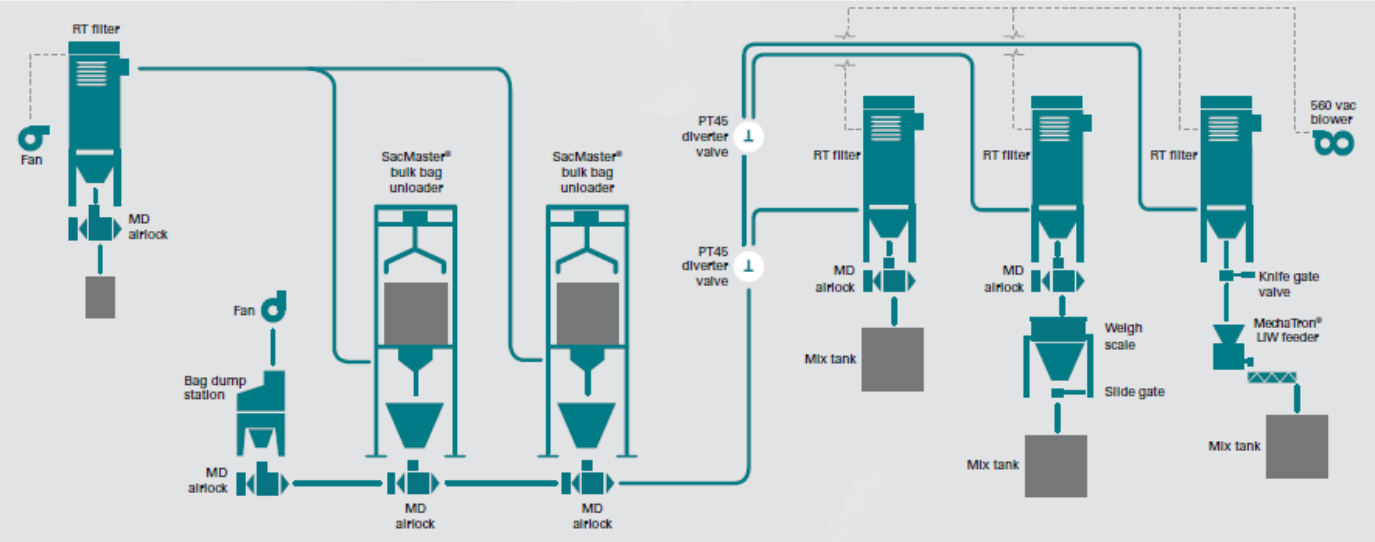
Powder Feeding

Feeding these extremely cohesive materials into downstream process equipment through loss-in-weight equipment is challenging, but possible given the appropriate configuration.

Contents

Battery Recycling Systems

Solutions for both Hyrdometallurgical or Pyrometallurgical Processes



Additive Unloading Systems

Bulk bag unloaders, small bag dump stations, & pneumatic transfer systems to weigh hoppers are all upstream considerations in the recycling process.

Indirect Coolers

Cooling material throughout the pyrometallurgical process is important as material selection becomes critical with these high temperatures.

Contents

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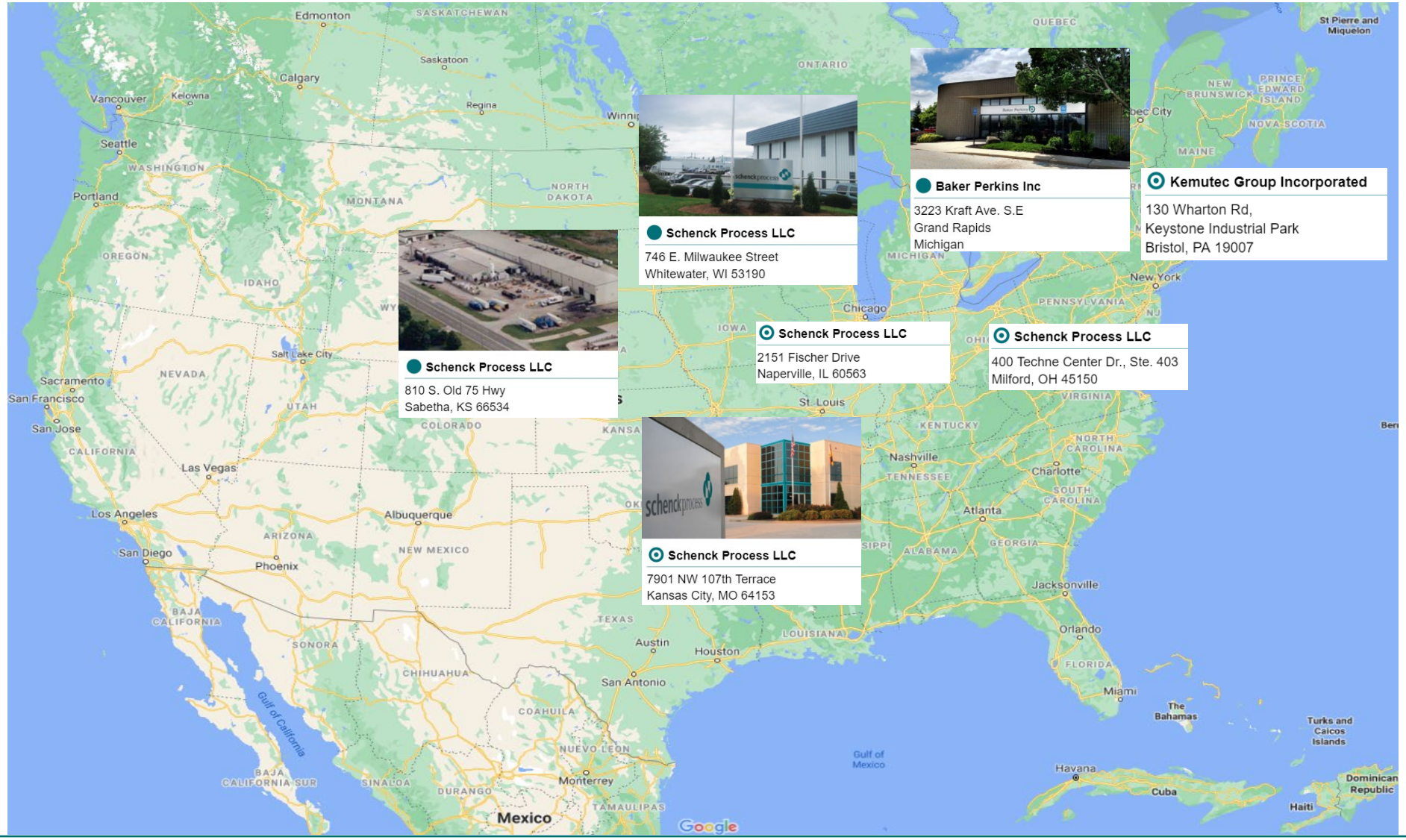
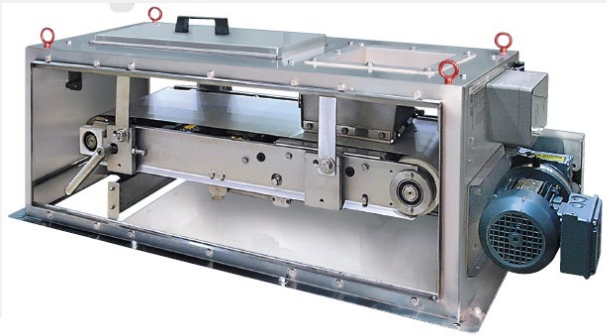
Contents

About Us

North American Locations



Weighing and Feeding Equipment



Loss-in-weight Feeders

- Flex-wall and steel hopper designs
- Accuracies down to 1/4%
- Rates of g/min to m^3/hr

Weighbelt Feeders

- Weight controlled feeding, totalizing, or batching
- Belt influence compensation
- Rates from pilot scale to 500tph systems

Flow Meters

- Coriolis-style
- Impact plate style
- Curved plate style
- Rates from 0.5 tph to 300 tph

Vacuum Loaders

- Low rate transfer of powders and granular material
- On-board eductor or remote vacuum source

Weighing & Feeding Equipment

Gravimetric Feeders – Mechatron® Coni-Flex

Low Range through High Range Mechatron

- Family of feeders provides discharge rates from 0.01 to 1,100 ft^3 / hr (4.5 cc/min to 31m^3/hr)
- The unique design allows for removal of the feed hopper, helix, and drive components from the non-process side of the feeder.

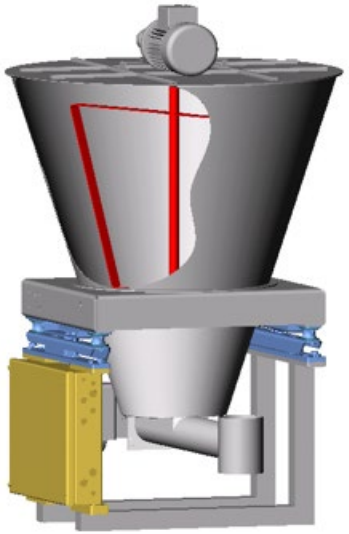
- The optional feeder mounted control panel allows for pre-wired and pre-tested controls.
- Typical accuracies of 2% to 5% when running volumetrically and 1/4% to 1.0% when running gravimetrically

Weighing & Feeding Equipment

Gravimetric Feeders – Mechatron® Coni-Steel

Internal Agitation

The internal agitation is driven from the top of the machine, simplifying cleaning, if necessary.

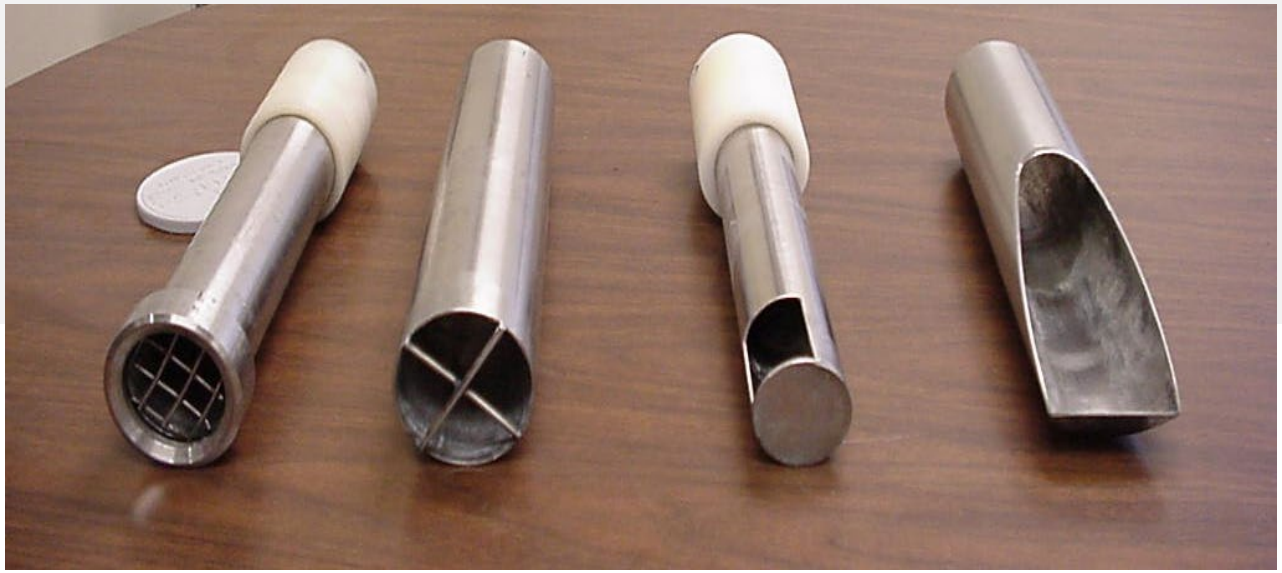


“Vibro“ Conversion

The helix, and nozzle are replaced with a vibrating tray.

Weighing & Feeding Equipment

Helix and Nozzle Solutions



Helixes

Material properties and discharge rates drive helix design, including pitch, product contact requirement, center rod requirement, and stirring rod requirement

Nozzles

Material properties and accuracy requirements drive nozzle design, including side discharges, discharge screens, etc

Weighing & Feeding Equipment

Gravimetric Feeders – AI/AP-300 Purefeed

AI (Industrial) & AP (Pharma) 300 Purefeeds

- “Lab Scale” feeders have discharge rates from 2 g/min to 150 kg/hr
- Similar flexible hopper design to the Mechatron feeders
- Typical accuracies of 1.5% to 2.5% when running volumetrically and 0.25% to 1.0% when running gravimetrically

Weighing & Feeding Equipment

Gravimetric Feeders - Distribution

Mechatron w/ Spreading Nozzle

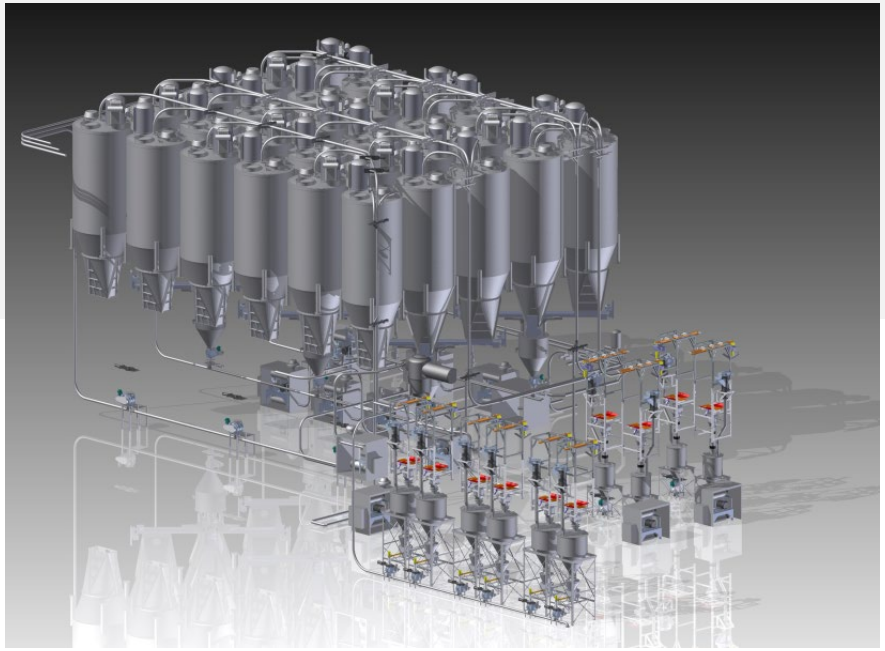
An extended helix and nozzle with slotted PTFE sleeves allow controlled distribution of powder and granulated material.

Solidsflow 5000 Streamout Feeder

Linear vibration of a tray under a hopper with adjustable gates allow controlled distribution of material across a set width.

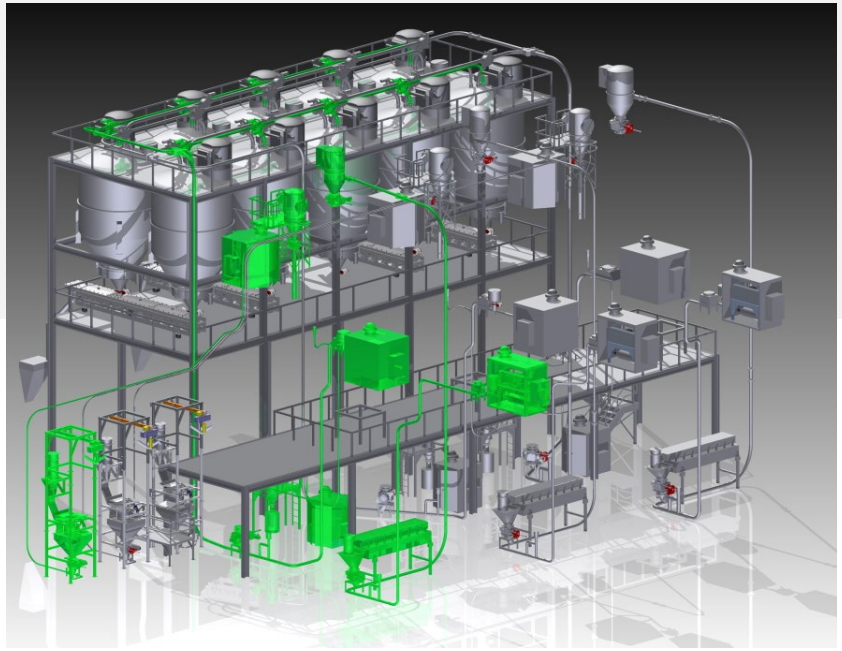
Pneumatic Conveying & Filtration Systems

System Offerings



Postive Pressure Systems

- Dilute Phase
- Enhanced Dilute Phase
- Closed Loop
- Batch Dense Phase
- Continuous Dense Phase

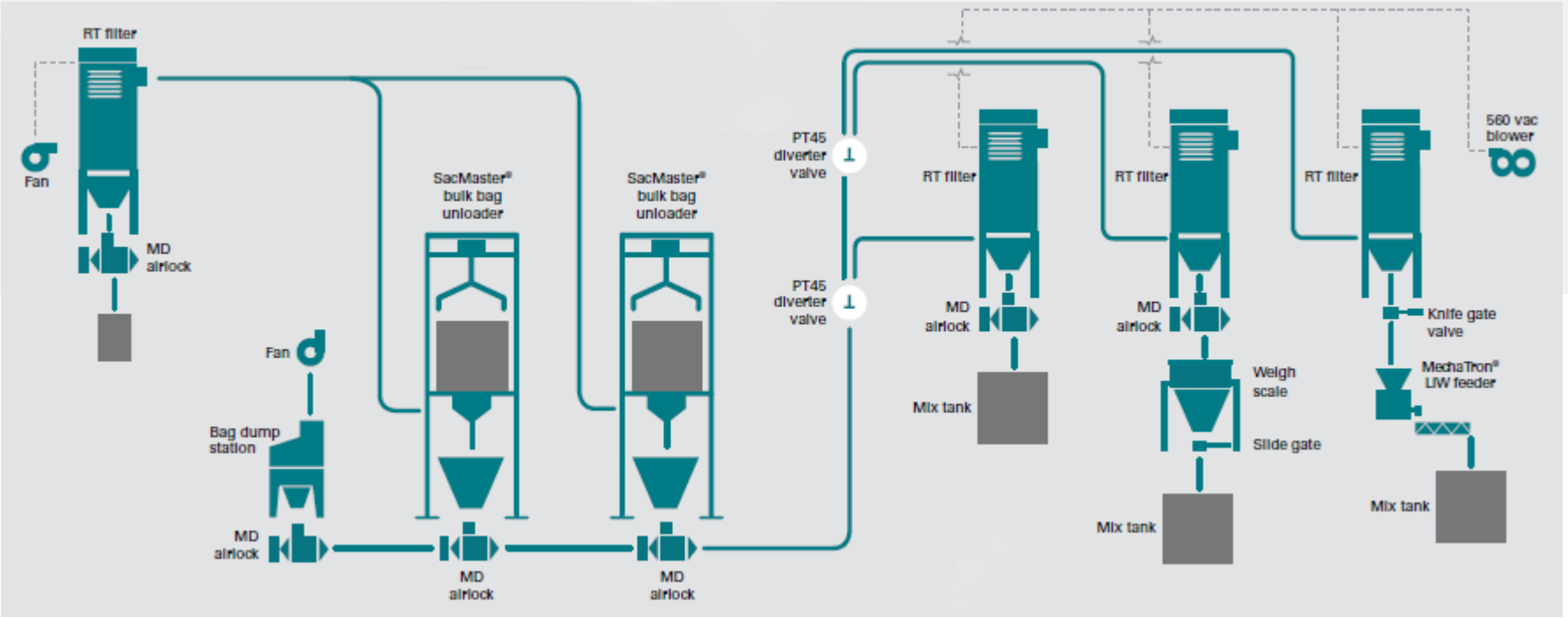


Negative Pressure Systems

- Dilute Phase
- Enhanced Dilute Phase
- Closed Loop
- Vacuum Dense Phase
- Negative Air Lift

Pneumatic Conveying & Filtration Systems

Dilute Phase & Enhanced Dilute Phase

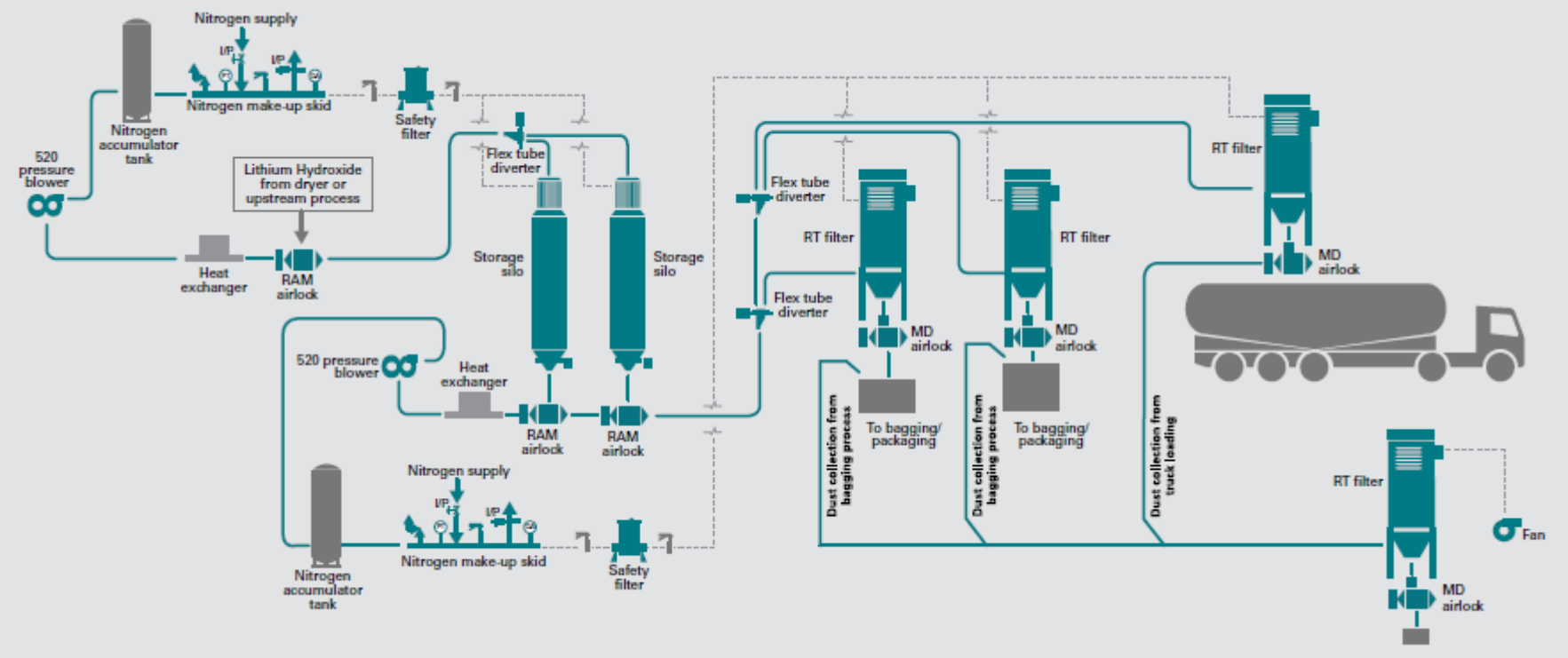


Additive Transfer Systems

From FIBCs / bulk bags to hand-adds or 50 lb bags, positive and negative pressure dilute phase conveying systems can be used to transfer base and additive materials from operator-friendly areas to process destinations

Pneumatic Conveying & Filtration Systems

Closed Loop Systems

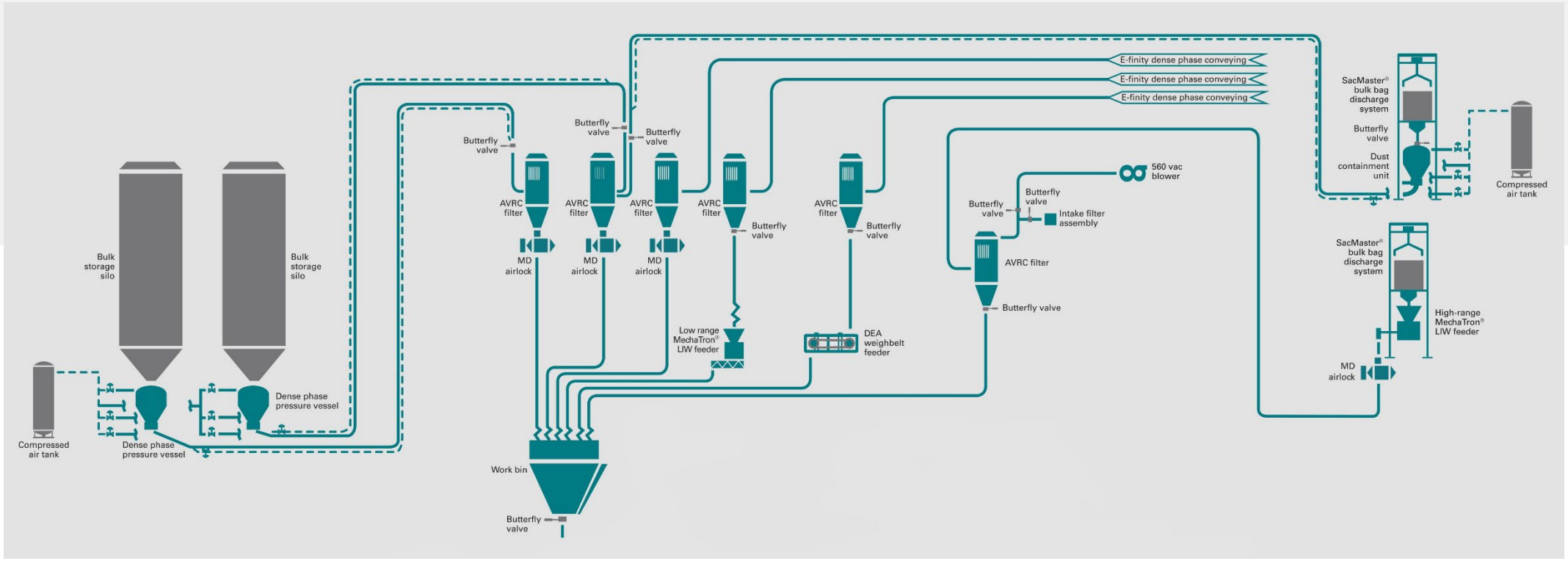


Nitrogen, CFA, and Conditioned Air Conveying

Many materials in the lithium-ion battery industry are sensitive to ambient air conditions. Pneumatic conveying systems can be designed with this in mind by controlling the motive air properties.

Pneumatic Conveying & Filtration Systems

Dense Phase



Batch Dense Phase & Continuous Dense Phase

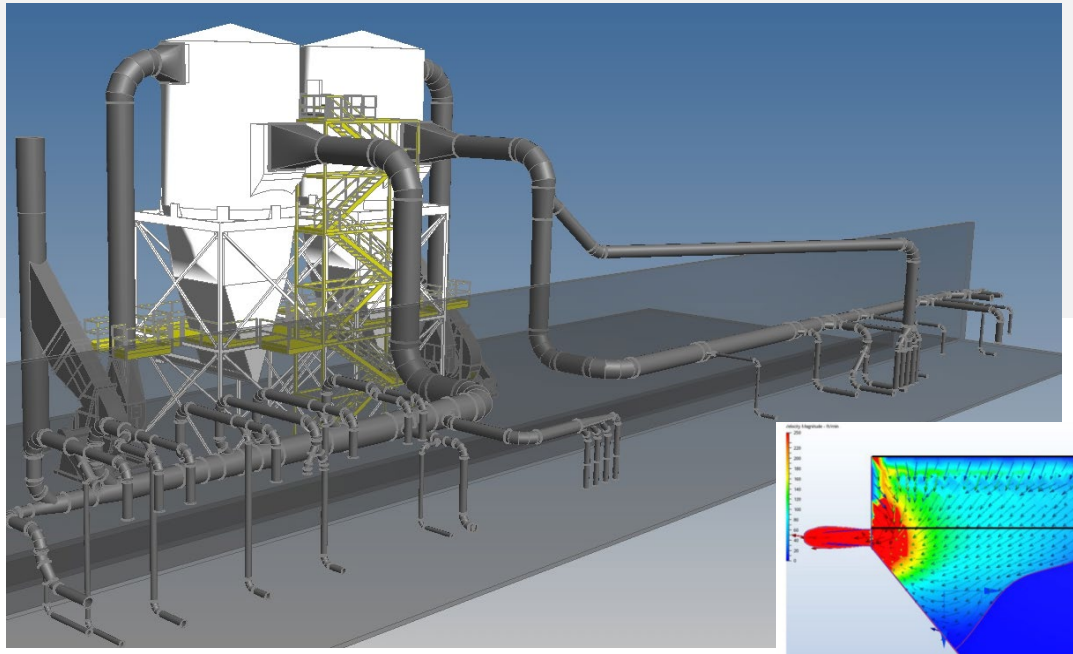
To minimize abrasion and material degradation, a particularly important point for cathode-related materials, high pressure, low velocity conveying is recommended.

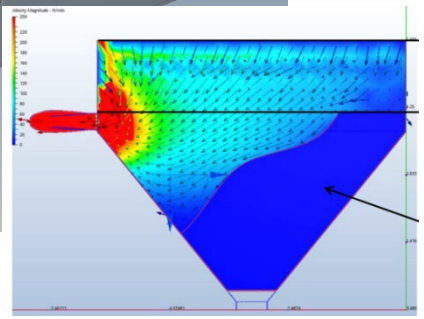
Pneumatic Conveying & Filtration Systems

Dust Collection & Filtration

Air Filtration Systems

- Filter/Receivers for pneumatic conveying
- 100CFM to 250,000+ CFM filtration options
- HEPA options for facility air reclamation
- Explosion mitigation equipment incorporated into system designs





Engineering Surveys

- Evaluation of existing equipment condition & size, including ductwork
- Dust particle size analysis and emission testing
- Field measurement of dust producing equipment
- Issue report with findings and solutions/modeling

Powder Processing Systems

Kemutec – Size Reduction Equipment

KEK Kibbler

- Coarse Milling
- Pre-Breaking
- Grinding

150mm to 3mm

KEK Cone Mill

- Versatile Intermediate Grinding
- Minimal Fine Generation
- Multiple Drive Options

D50 - 500µ to <250µ

KEK Universal Mill

- High Energy
- One Pass
- Fine Grinding

D50 - 100µ to <20µ

PPS Air Classifying Mill

- Ultra Fine Milling
- Multipass
- Controlled Grinding

D50 - 20µ to <5µ

Powder Processing Equipment

Kemutec – Sifting & Screening

KEK Centrifugal Sifter

- Policing – removing extraneous material
- Scalping – removing oversize product
- Conditioning – creating uniform density
- De-agglomeration – delumping

GKM Tumbler Screeners

Represented in the Americas by Schenck Process, GKM‘s mulit-deck screening allows for multiple particle size cuts for separate downstream processing

Thermal Processing Systems

Calciners, Coolers, & Dryers

Bartlett-Snow Rotary Calciners

- Lab scale to production sizes
- Processing at 2800+°F (1540+°C)
- Internal bed temperature monitoring

Bartlett-Snow Rotary Coolers

- Lab scale to production sizes
- Processing up to 2900°F (1600°C)
- Cooled material approaching 212°F (100°C)

Bartlett-Snow Rotary Dryers

- Lab scale to production sizes
- Processing up to 930°F (500°C)
- Drying media by burners, waste heat sources, and others

Project Management

Calciners, Coolers, & Dryers

Statistics

- Projects ranging from $50K to $300M
- 1000+ completed projects in 20-year history
- High customer retention rate

  80% of projects come from repeat projects customers

Staff Highlights

- 100 Project Managers and Engineers
- 50 Process Control Engineers
- 82 Equipment Design Engineers
- 8 Quality control Engineers
- 16 Global Service Engineers

Service and Aftermarket

Remote service and cloud connectivity

We are available anywhere, anytime!.

Our data driven services

Our experience in developing, building, and testing process machinery allows us to predict precisely how your machines will behave in nearly any circumstance. By combining this knowledge with the latest digital technologies, we can take our analysis even further. We can identify deviations long before the normal alarms go off. Our digital monitoring not only secures safe and efficient operation but extends your reaction times, letting you prepare for possible problems.

CONiQ® Assist Remote Services Program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