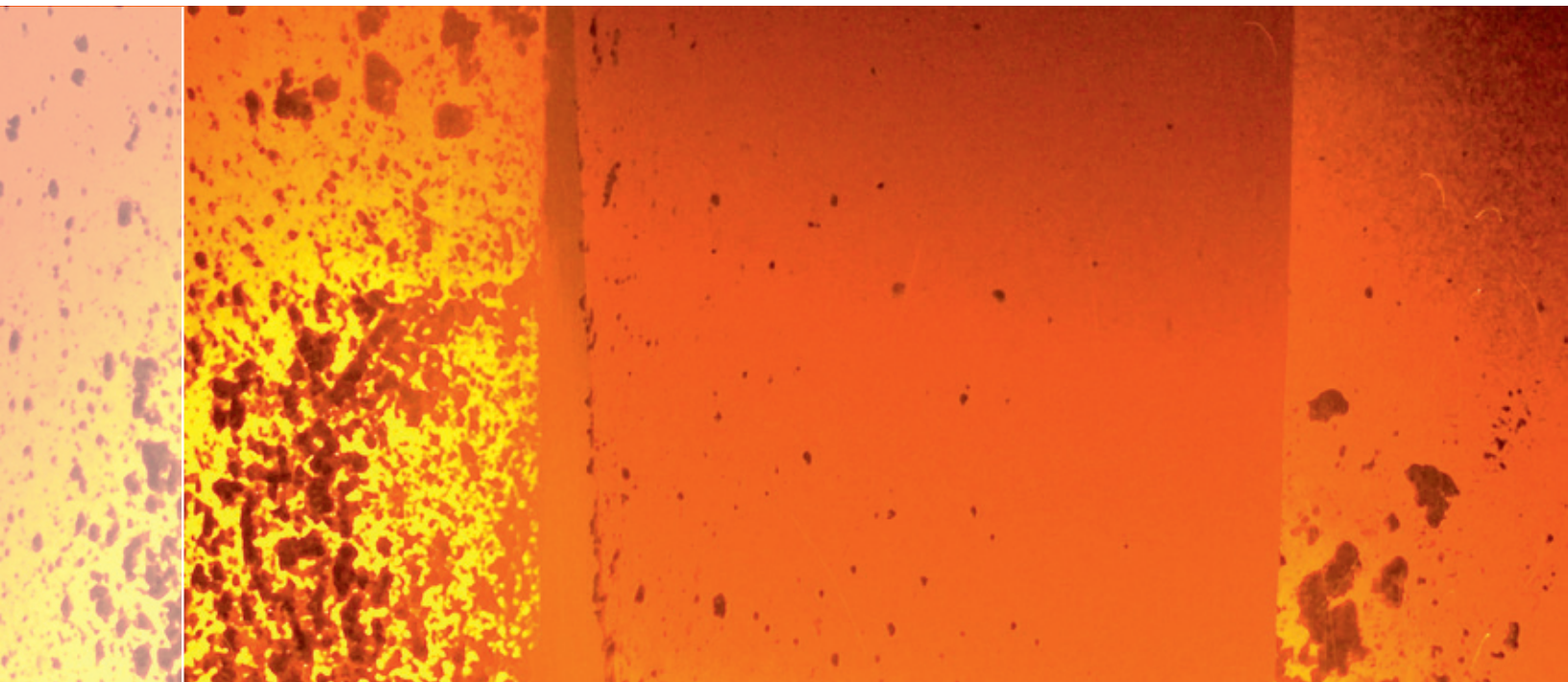


Pneumatic Conveying for Iron & Steel and Non-Ferrous Production Plants



Using innovative technologies and system designs to improve process efficiencies

Schenck Process Group – Your Partner Worldwide



Acting locally to support your needs the Schenck Process Group is working where you are.

With a global network of sites and competent partners, the name Schenck Process is synonymous throughout the world with process expertise and well-engineered measuring technology for industrial weighing, feeding, conveying, screening, automation and air filtration technology.

Our key skills include planning processes, feeding bulk materials, controlling flows of material, recording flows of goods, weighing goods and automating transport processes.

Members of the Schenck Process Group are:

schenckprocess 

stock 
schenckprocess group

fairfield 
schenckprocess group

clydeprocess 
schenckprocess group

pentec 
schenckprocess group

schencAccuRate 

redler 
schenckprocess group

screenex 
schenckprocess group

macprocess 
schenckprocess group

Our key benefits

- ❖ Significant increases in productivity
- ❖ Environmental sustainability of the processes
- ❖ High system availability, reliability and performance
- ❖ Low operating costs and maintenance
- ❖ Greater Process control
- ❖ Cleaner and dust free working environment
- ❖ Cost savings through process efficiencies
- ❖ Flexibility to integrate with existing and emerging technologies
- ❖ Comprehensive aftercare service and spares availability
- ❖ A wealth of experience to form close working relationships



The name Schenck Process is synonymous throughout the world with process expertise and well-engineered technology for the key processes of weighing, feeding, conveying, screening, automation and air filtration technology. Living up to our claim that “we make processes work” across the metals industries.

The combined products and process technologies from Schenck Process are able to handle the raw and processed materials in the Iron and Steel, Foundry and Non-Ferrous Metal industries from delivery to despatch. Using Schenck Process pneumatic technologies the company can provide systems that are suitable for the main materials handling movements within a production plant. Schenck Process also delivers ‘state of the art’ process injection solutions for these industries.

By using Dense Phase Pneumatic Conveying, for example, difficult materials that are abrasive or friable are transported by pushing the material along a pipe in a plug form at very low velocities. This means minimal wear on the pipe bends, and minimum damage to materials, providing minimum maintenance and long life of the installation. Efficient use of compressed air also gives low power consumption and running costs. Standard systems are available for material temperatures up to 450°C, rates of over 300 t/h and for distances over 2 km, depending upon the material, all in a single pipeline but other specialised solutions outside these parameters can also be achieved.


Experts in Iron and Steel and Foundry industries

In the Iron and Steel and Foundry industries Schenck Process systems are able to be used to handle tanker unloading, coal handling, dust catching and dust handling, lime and foundry materials handling, lock hopper systems, coal injection to Tuyeres, fine iron ore injection and on-line mixing of materials.

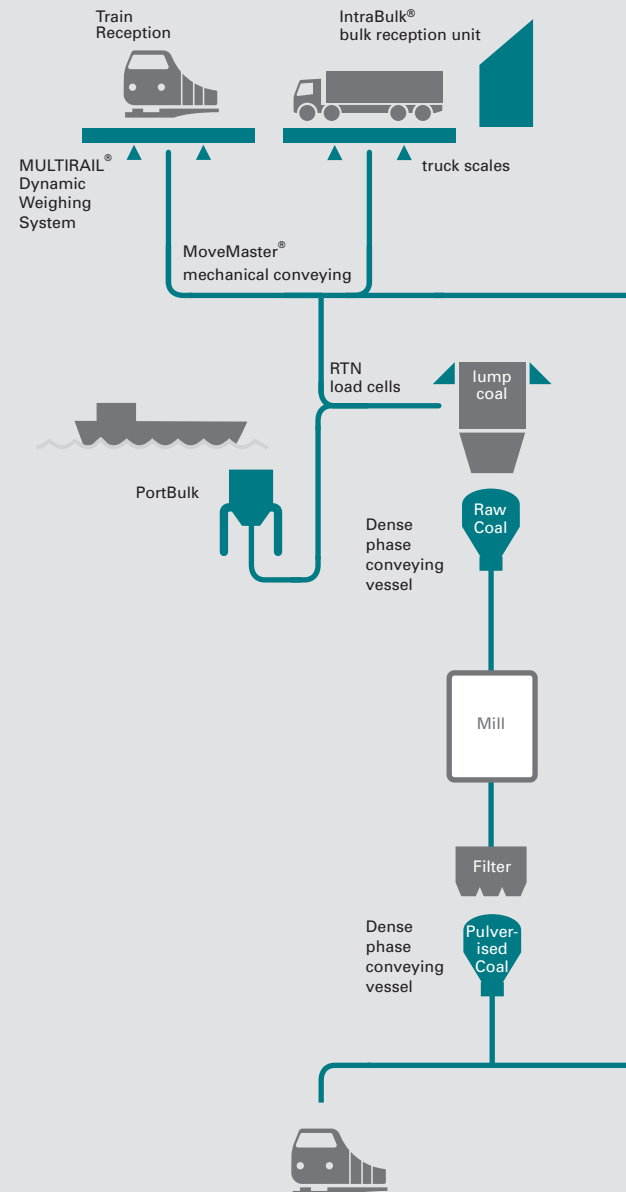
The range of materials that can be transported include raw coal, pulverised and granular coal, sinter fines, lime, coke, sand, pelletised plastic, charcoal and many others. Schenck Process specialise in pulverised coal injection.

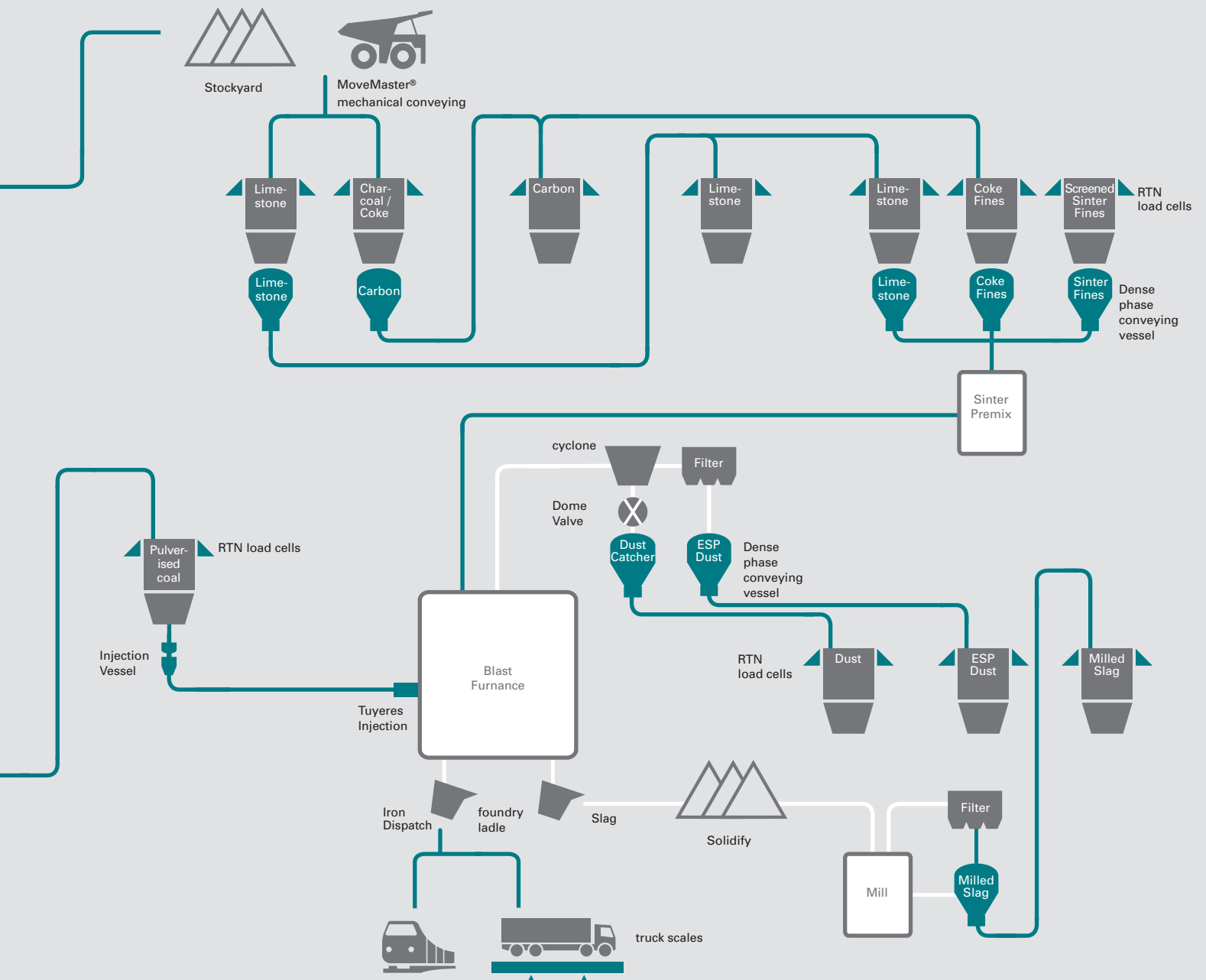
Application Example: Iron Making Blast Furnace by Schenck Process

Legend:

 Process step covered by the Schenck Process Group

Unless stated otherwise, green lines indicate pneumatic conveying.





Excellence in Non-Ferrous metals industries

In the Non-Ferrous metals industries the schematic diagrams on the following pages indicate how Schenck Process pneumatic conveying and injection technology can be applied to the processing of copper, tin, nickel, platinum, lead, zinc and aluminium. The technology can be used for the key processes of moving materials from the stockyard through the smelting, converting, refining and slag cleaning or in the case of aluminium through the calciners, electrolysis and ingot creation processes. Schenck Process


specialise in precision injection of pulverised coal and / or blended metal concentrates and additives to furnace lances such as in the Top Submerged Lance Furnace and additives to burners and lances in key smelting processes.

In the case of Base Metals such as copper, nickel and tin the Schenck Process pneumatic conveying and injection technologies have an excellent

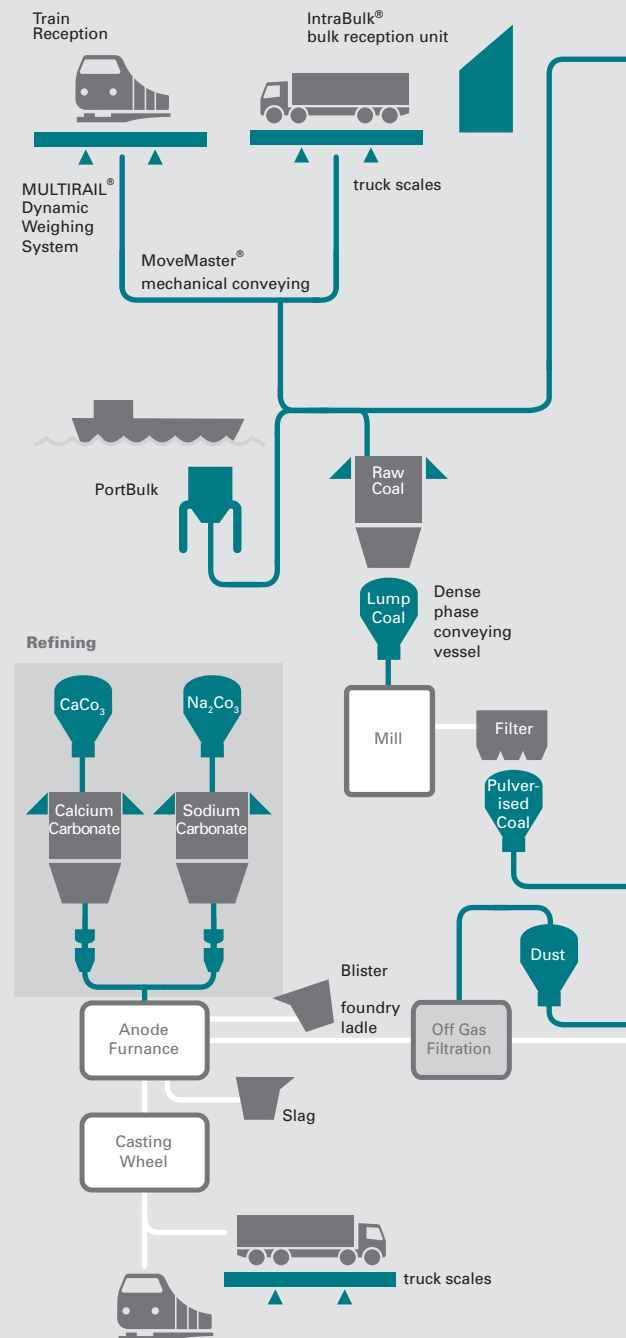
Application Example:

Base Metals Cu, Ni, Sn by Schenck Process

Legend:

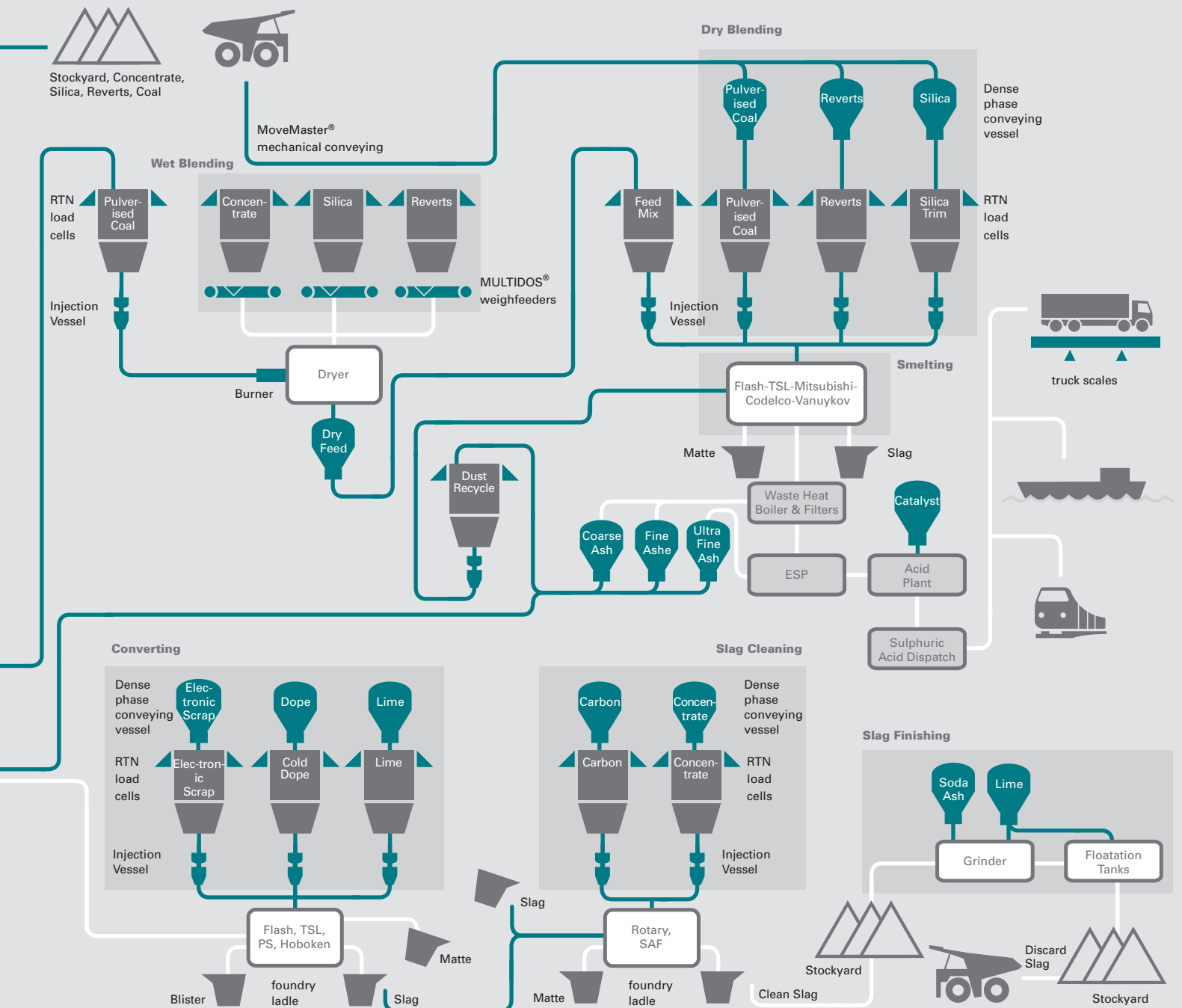
 Process step covered by the Schenck Process Group

Unless stated otherwise, green lines indicate pneumatic conveying.



reputation for durability and reliability in handling of these highly abrasive materials. Copper concentrate, silica, reverts, matte and metallurgical dust are difficult materials to convey but Schenck Process have the expertise in handling these materials. Schenck Process system design and configuration ensure low wear and low maintenance requirements and high system availability.

Schenck Process has developed a unique copper concentrate handling and injection system that can significantly enhance the output from a copper smelting process. This solution can be utilised on a bath or flash smelter and other secondary processes for injecting dusts, additives, carbons, fuels or fluxes which has helped achieved a 30% increase in output.




Excellence in Non-Ferrous metals industries

The Schenck Process pneumatic conveying and injection technologies are also used extensively in the lead, zinc and aluminium industries. At the heart of these production facilities lie the smelting technologies which are used to melt and purify the metal concentrates. Schenck Process has developed a series of solutions which have been

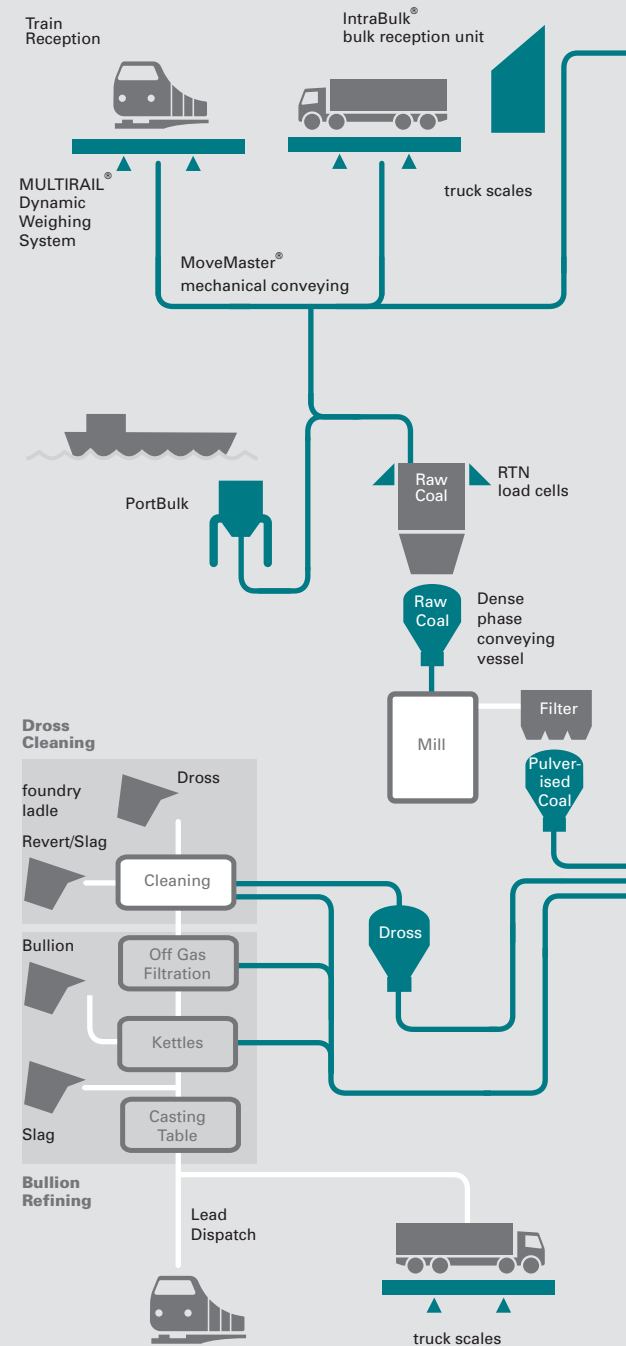
utilised to transform smelting performance by accurately, reliably and continually feeding material into process. The solutions use the appropriate pneumatic conveying mode to achieve the best availability and reliability of the system. Through a high level of technical design

Application Example: Lead and Zinc by Schenck Process

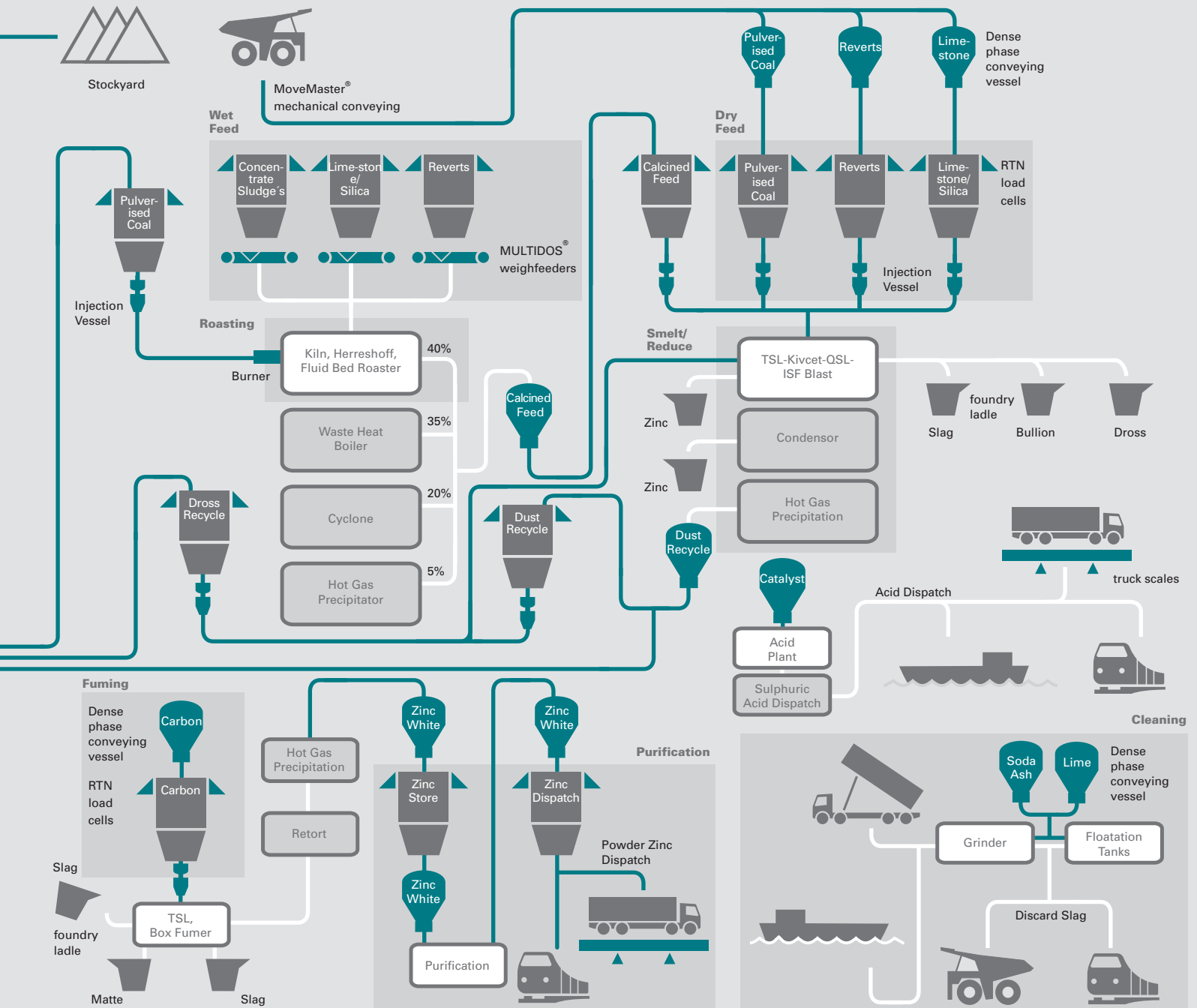
Legend:

 Process step covered by the Schenck Process Group

Unless stated otherwise, green lines indicate pneumatic conveying.




and rigorous testing in our in-house industrial scale laboratory they ensure first time successful start-up of the process and the highest level of continuing performance of the production plant.



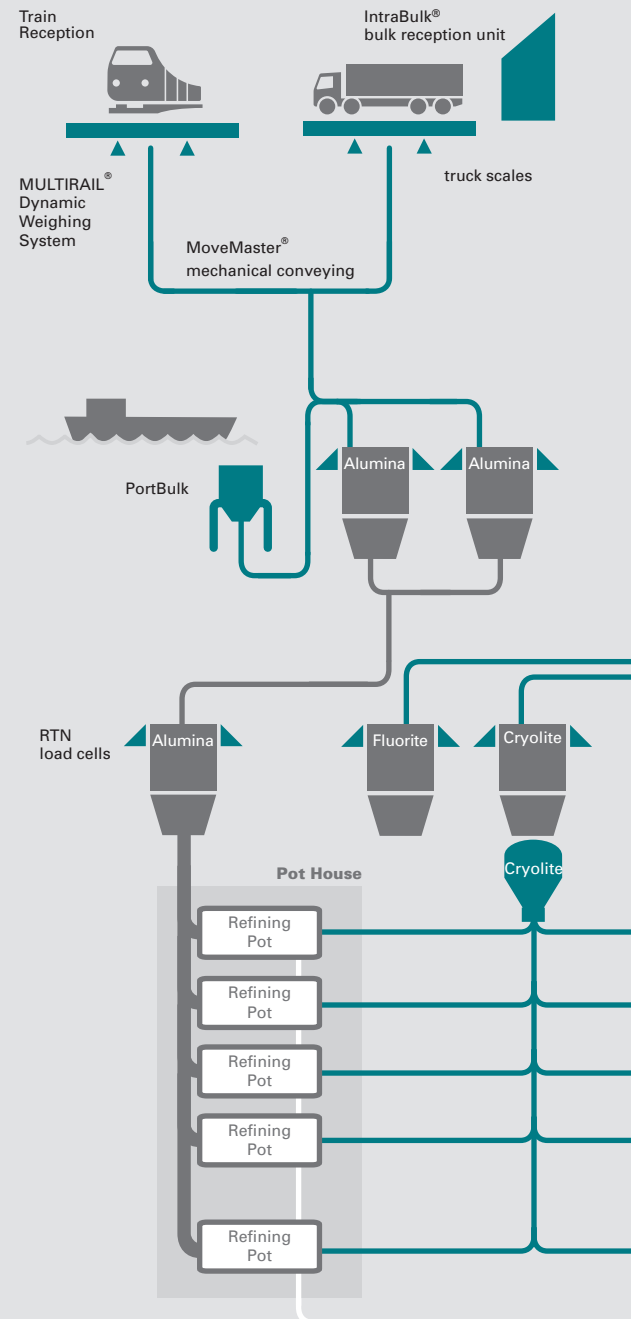
Excellence in Non-Ferrous metals industries

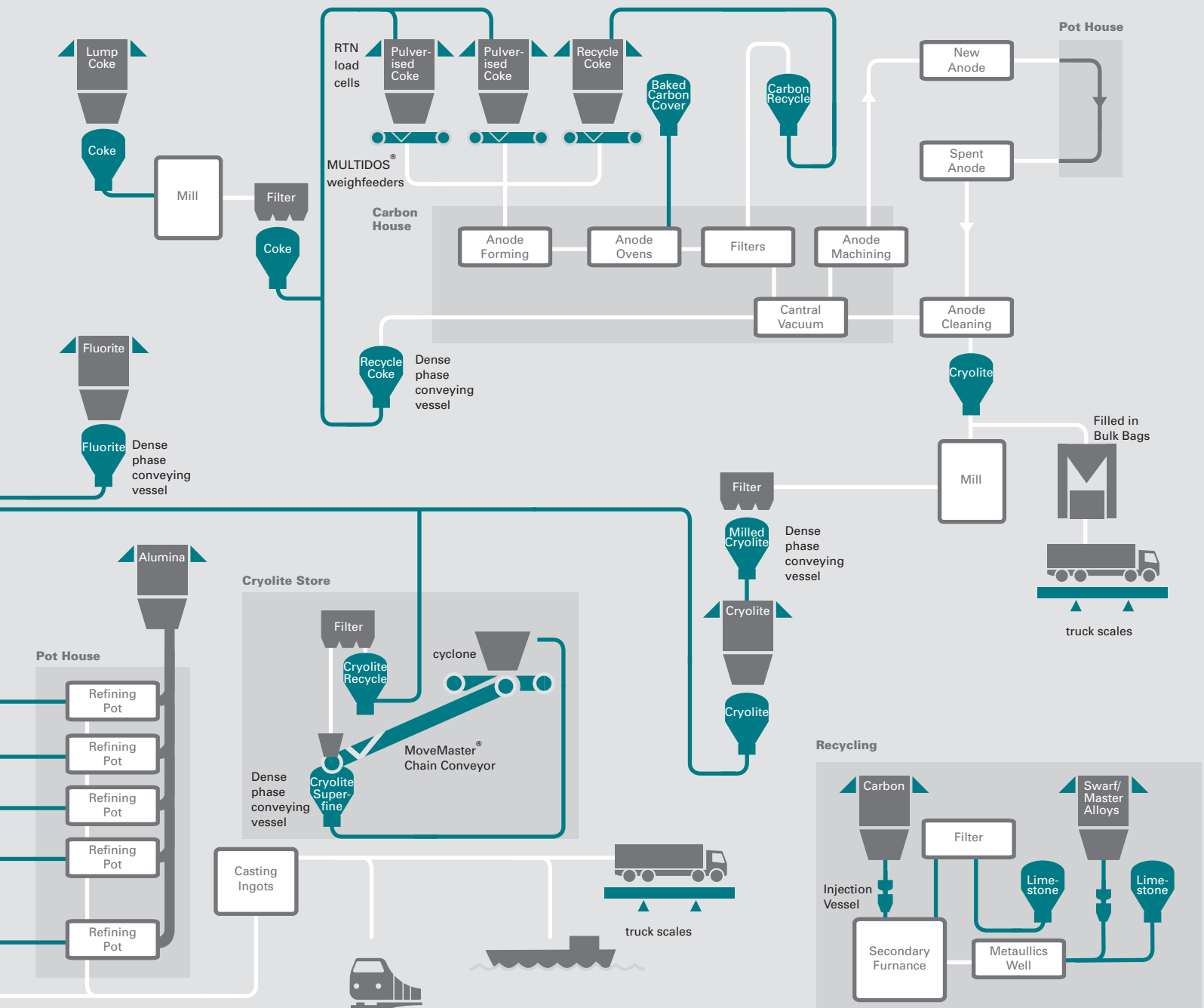
Application Example: **Aluminium** by Schenck Process

Legend:

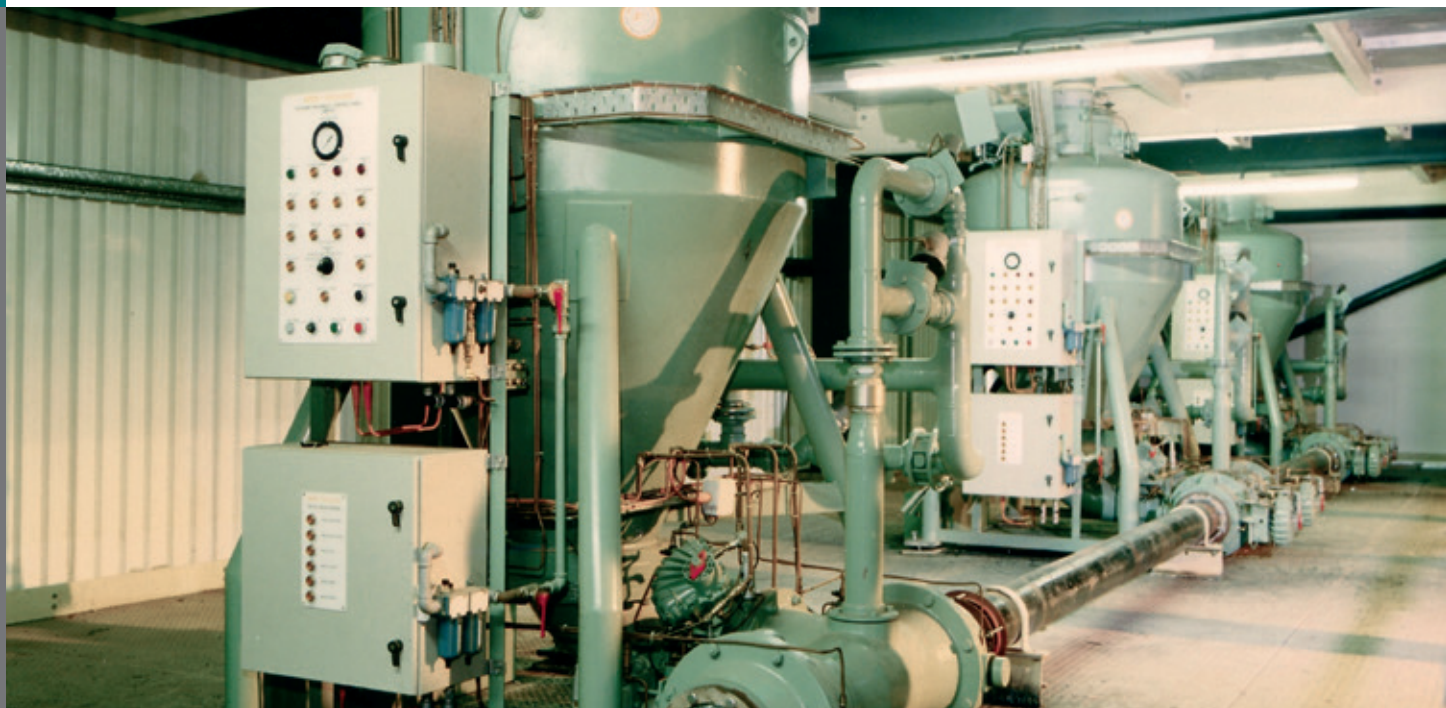
 Process step covered by the Schenck Process Group

Unless stated otherwise, green lines indicate pneumatic conveying.





Dense Phase Pneumatic Conveying



By using Dense Phase Pneumatic Conveying difficult materials that are abrasive or friable are transported by pushing the material along a pipe in a plug form at very low velocities. This means minimal wear on the pipe bends, and minimum damage to materials, providing minimum maintenance and long life of the installation. Efficient use of compressed air also gives low power consumption and running costs. Standard systems are available for material temperatures up to 450°C, rates of over 300 t/h and for long distances over 2 km, depending upon the material, all in a single pipeline but other specialised solutions outside of these parameters can be achieved using the technical expertise and experience of Schenck Process engineers.

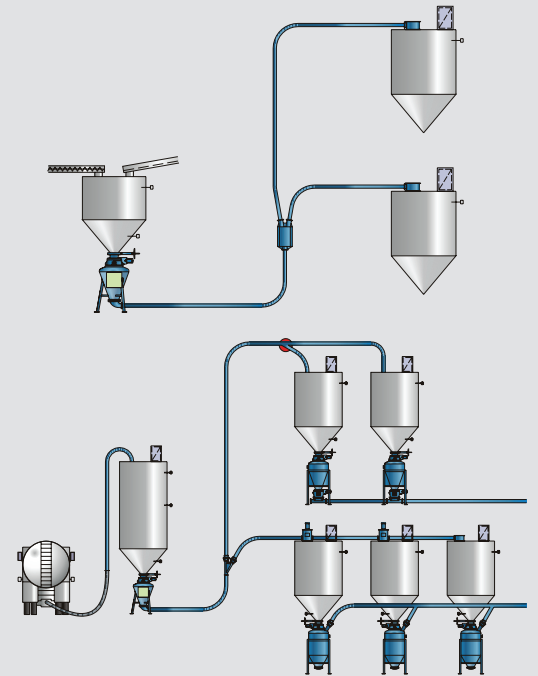
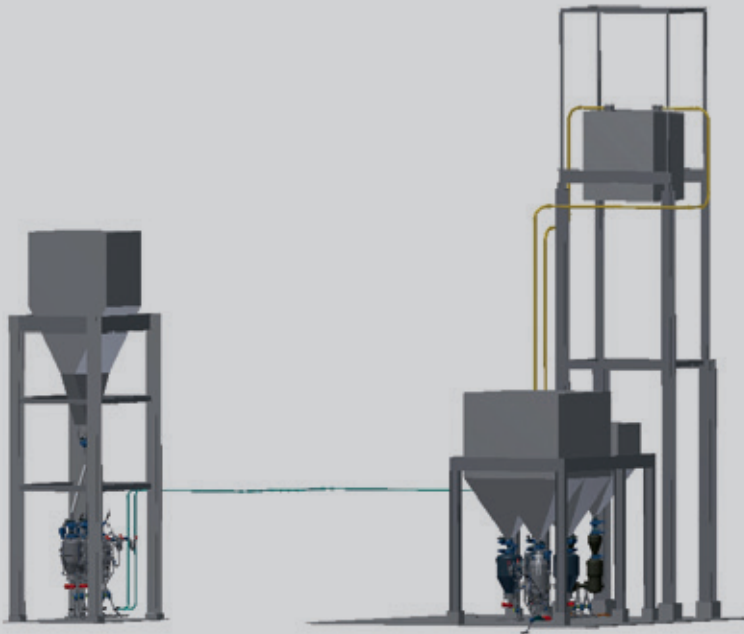


Commonly Conveyed Products:

- ❖ Fly Ash
- ❖ Sand
- ❖ Pulverised Coal / Granular Coal
- ❖ Raw Lump Coal
- ❖ Non Ferrous Concentrates
- ❖ Carbon
- ❖ Ground Minerals
- ❖ Limestone
- ❖ Dusts
- ❖ Additives
- ❖ Granulated Slag
- ❖ Sinter Dusts
- ❖ Electronic Scrap

Dense Phase using Pressure Vessels

- ❖ The most energy efficient form of pneumatic conveying
- ❖ High throughputs achievable
- ❖ Long conveying distances achievable
- ❖ Minimum maintenance
- ❖ Low number of moving parts
- ❖ Low product degradation



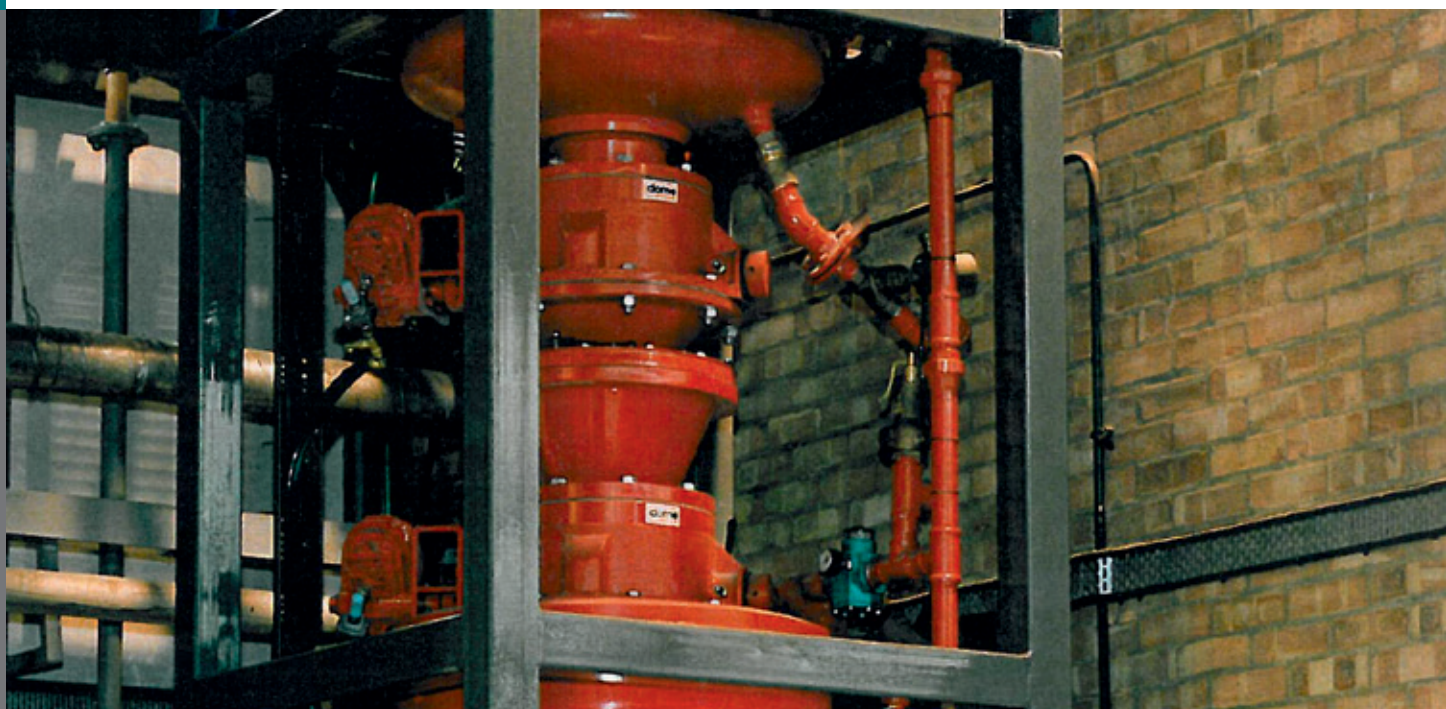
The range of pumps for dense phase conveying are designed for different applications according to the material and the distances the material is to be conveyed. The range of dense phase pumps are:

- ❖ DensPhase pump – simple system for low rates and short distances
- ❖ PD Pump – more efficient system for fine particles
- ❖ CD Pump – semi-continuous dense phase system
- ❖ TD Pump – high capacity pump for long distances in a batch system for fine particles
- ❖ MPD Pump – large multiple pickup systems for fine particles
- ❖ SD Pump – suitable for sand conveying
- ❖ AV Vessel – suitable for small, multiple pick up points for powders and granules

Each pump can be fitted with a number of optional extras such as high and low level probes, weighing, vent valves, internal coatings, vessel fluidisation or outlet spheri valves. Consultation with the client is used to specify the most ideal combination of controls for the dense phase pump that is suitable for the material and conveying distances required.



Injection Technology



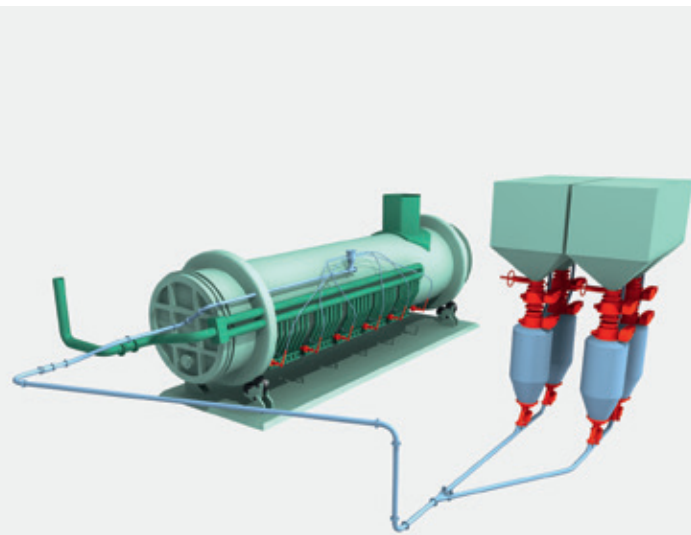
For pneumatic conveying applications where an accurate steady controllable feed into a process is required, Schenck Process RotoFeed and RotoScrew injection technology provides the answer.

Utilising the proven design of the Spheri Valve and pressure vessel technology from the Schenck Process dense phase range, the addition of either a RotoFeed or RotoScrew acting as a volumetric metering feeder with a variable speed drive creates the injection system solution of choice.

By incorporating weighing technology into the system a gravimetric version is created which can achieve accuracies of better than $\pm 1\%$ and a turndown ratio of 10:1.

Capable of injecting against back pressures such as in a chemical reactor, coal gasification process or blast furnace, or under a molten head of liquid metal such as in a copper bath smelter, or direct into a burner on a combustion process such as a cement kiln or flash furnace burner.

This technology is also suitable for multi-point injection of material and suitable for either batch or continuous injection.



Controllable Feed

Provides a steady, controlled feed of material into a process.

Adjustable Injection Rate

The injection rate is adjustable and can be controlled to meet the needs of the process, 5:1 turndown is standard.

Accurate Feed

The injection rate is accurately controlled, by the RotoFeed/RotoScrew to $\pm 2\%$ by volume or $\pm 1\%$ by weight.

Injection against pressure

The material can be injected into a pressurised environment.

Integrated into Process

Injection systems normally form an integrated part of a larger process plant.

Wide range of materials

RotoFeeds are used for fine fluidisable materials through granulars to 10 mm. RotoScrew can feed cohesive or irregular and large materials as well as highly abrasive materials including:

- ❖ Metal concentrate
- ❖ Pulverised coal
- ❖ Granular coal
- ❖ Coke
- ❖ Lime/Limestone
- ❖ Iron ore
- ❖ Electronic scrap

The Spheri Valve Range

The most effective bulk material handling valve in the world.



The highly innovative and well proven Spheri Valve from Schenck Process is reputedly the most effective fast closing, bulk material handling valve in the world.

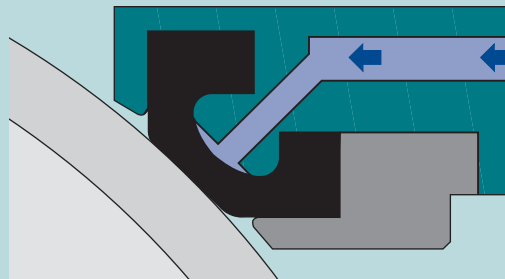
The Spheri Valve was developed by Clyde Materials Handling in 1974 for use with pneumatic conveying systems and as a stand alone product.

To date, more than 20,000 Spheri Valves have been sold worldwide, for applications across a range of industries including:

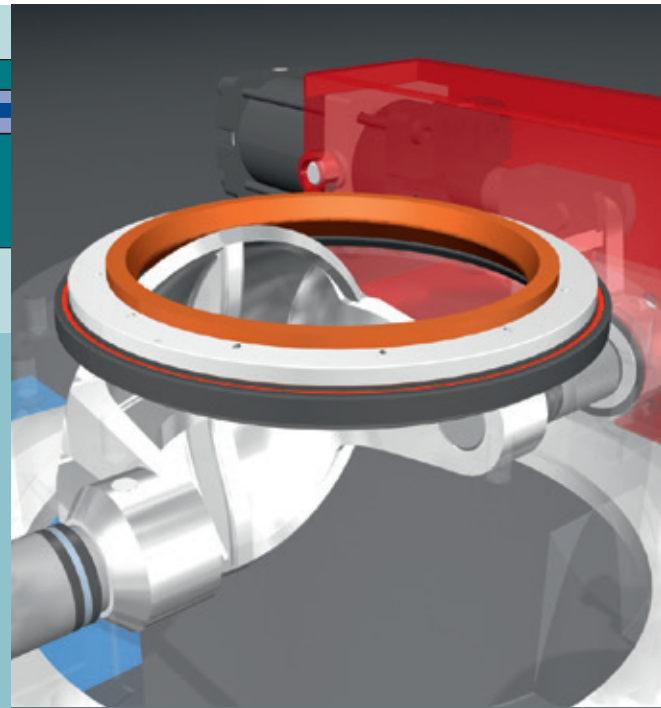
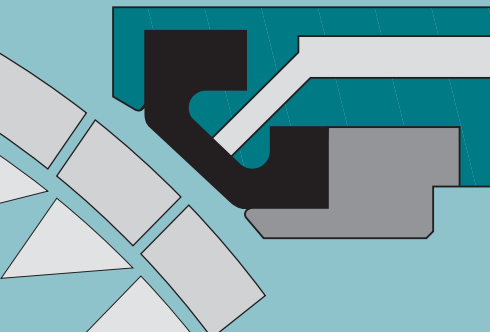
- food, pharmaceuticals, chemicals, plastics, minerals, power, iron and steel.

The same simple design philosophy also eases the task of preventative routine maintenance and makes parts replacement a quick and simple task.

The seal automatically deflates during opening and closing, thereby avoiding contact with the dome and eliminating unnecessary wear.



The seal automatically inflates only when the dome is fully closed.



Features and benefits include:

- ❖ Full bore unobstructed material flow
- ❖ Can cut through moving or static columns of material
- ❖ Wide range of valve sizes: 50mm (2") to 750mm (30")
- ❖ 10 bar design pressure as standard
- ❖ Forms pressure tight seal when closed
- ❖ Inflatable seal leakage detection system
- ❖ Designs can be provided for pressures up to 35 bar (507 psi)
- ❖ Simple, fully proven design
- ❖ Can handle material temperatures from -20°C to $+480^{\circ}\text{C}$ (-4°F to 896°F)
- ❖ Long operating life
- ❖ Up to 1,000,000 cycles between major overhauls with most materials
- ❖ Suitable for vacuum applications
- ❖ Low maintenance
- ❖ Extremely quick seal replacement
- ❖ Fast operating function

Clyde Materials Handling Ltd was purchased by Schenck Process in 2011 and therefore the Spheri Valve and Clyde Process Pneumatic Conveying and Injection systems are part of the range of Schenck Process technologies.

TestCenter

Perfect reliability through more than 40,000 tests with more than 10,000 different types of bulk material at the Schenck Process TestCenters.



Extensive test facilities include an impressive array of pneumatic conveying and pneumatic injection systems.

Customers are invited to supply materials which can be tested using either dilute (lean), medium or dense phase technology in either positive or negative pressure configurations, in conjunction with a selection of pipe diameters, route configurations, transfer distance and throughputs.

Most site conditions can be accurately replicated using full size systems, including transfer distances up to 500m. System efficiencies and any material degradation can be fully monitored to ensure the best solutions are proposed. This also minimises the likelihood of overspend or delays during installation and commissioning.



Schenck Process has an extensive materials database covering over 10,000 samples where characteristics such as particle size distribution, shape, porosity, bulk density, temperature, moisture content, fragility and air retentiveness have been measured and the most suitable conveying method determined.

This practical experience is invaluable in determining the most effective solution to a customer's application and details of every new test is added to the database.

This resource is also available to customers who independently need to establish the flow characteristics of a material or to help solve on-site problems with existing or competitor's systems.

Individual Solutions for the Most Extreme Conditions.

The harsher the environmental conditions, the more resilient the technical systems must be. This particularly applies to industries such as iron and steel and non-ferrous production.

Schenck Process Group offers these industries a wide range of reliable systems and sound application know-how.

→ FEEDING



MULTIDOS® H

Bulk Dosing

- ❖ Wide range of Schenck Process developed weighfeeders
- ❖ Feed rate up to 1,500 t/h
- ❖ Accuracy up to $\pm 0,25\%$
- ❖ Mechatronic design
- ❖ Long experience with many important industrial materials

→ CONVEYING



Mechanical Conveying and MoveMaster®

Bulk Conveying

- ❖ Tube Belt Conveyor
- ❖ U Belt Conveyor
- ❖ Corrugated Belt Conveyor
- ❖ Smooth material handling
- ❖ Horizontal transport and elevating
- ❖ Maintenance optimised design
- ❖ For various bulk materials
- ❖ En-masse Chain Conveying

→ CONVEYING



IntraBulk®

Truck Unloading

- ❖ Receiving buffer hopper and apron feeder as link to the continuous process
- ❖ Suitable for various products
- ❖ Dust extraction systems
- ❖ Quick and safe operation

→ WEIGHING

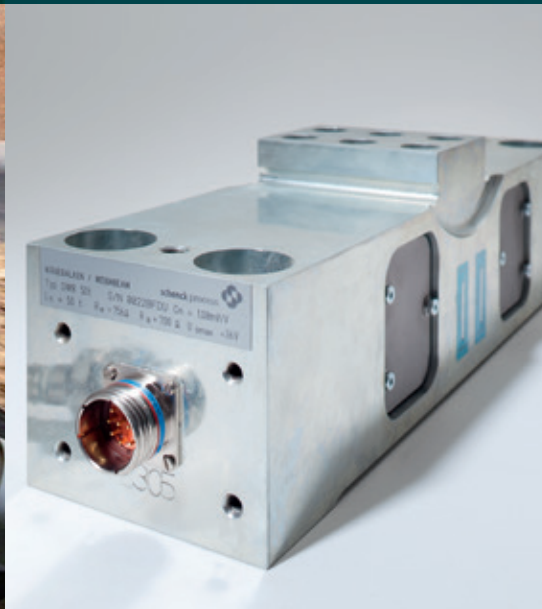


MULTIBELT®

Belt Weighing

- ❖ Precise mass flow measurement
- ❖ Standard and tailor-made design
- ❖ Accuracy up to $\pm 0,25\%$
- ❖ Optional legal-for-trade execution

→ WEIGHING



DWB weighbeam

Direct weighing technology

- ❖ Service temperature up to $150\text{ }^{\circ}\text{C}$
- ❖ Integrated sensor for temperature
- ❖ Compact, flat design
- ❖ Suitable to the construction of service free scales in severe environments
- ❖ High long-term stability
- ❖ High degree of repeatability
- ❖ Separate mounting of weighbeam and connecting cable possible

→ WEIGHING



Crane Weighing

- ❖ Integration inside new cranes or as modernisation Capacity up to 100 t
- ❖ Legal-for-trade accuracy
- ❖ No time loss for weighing
- ❖ Proven rugged design based on own engineering experience

→ WEIGHING



MULTIRAIL® HotMetalWeight

- Dynamic weighing for pig iron
- ❖ Production mass recording with 0.5% accuracy
 - ❖ Car refractory maintenance optimisation
 - ❖ Dynamic weighing in-motion
 - ❖ Automatic weighing process
 - ❖ Pitless and gap-free design
 - ❖ Completely adapted to the existing railway
 - ❖ Quick installation during regular railway maintenance

→ WEIGHING



MULTIRAIL® LegalWeight

- Train Weighing
- ❖ Dynamic railway scale for all wagon types
 - ❖ Legal-for-trade accuracy
 - ❖ No foundation
 - ❖ No rail gap
 - ❖ Fully automatic operation
 - ❖ Very quick installation
 - ❖ Static/dynamic platform weighbridges also available

→ WEIGHING



Truck Weighing

- ❖ Surface or pit mounted versions
- ❖ Optimised steel or concrete design
- ❖ Capacity up to more than 100 t
- ❖ Legal-for-trade accuracy
- ❖ Complete delivery, quick installation
- ❖ World wide references in all key industries



Process
Advanced
Service
System

PASS

Complete solutions for your requirements

Looking for after-sales solutions? Our extensive Process Advanced Service System (PASS) provides you with after-sales services – customised to your specific requirements.

The framework of our PASS program is designed with you in mind. With the guidance of our experienced after-sales team, you can create PASS packages comprising original spare and wear parts, various services and high quality components to meet your needs.

PASS is based on a modular principle – you can pick and choose any individual PASS product or a combination thereof. 4 categories help to easily find appropriate PASS products.

We would happily provide you with individual consultation, either as part of a PASS contract or on individual enquiry.

Whatever Full Service means to you – let's create it together!

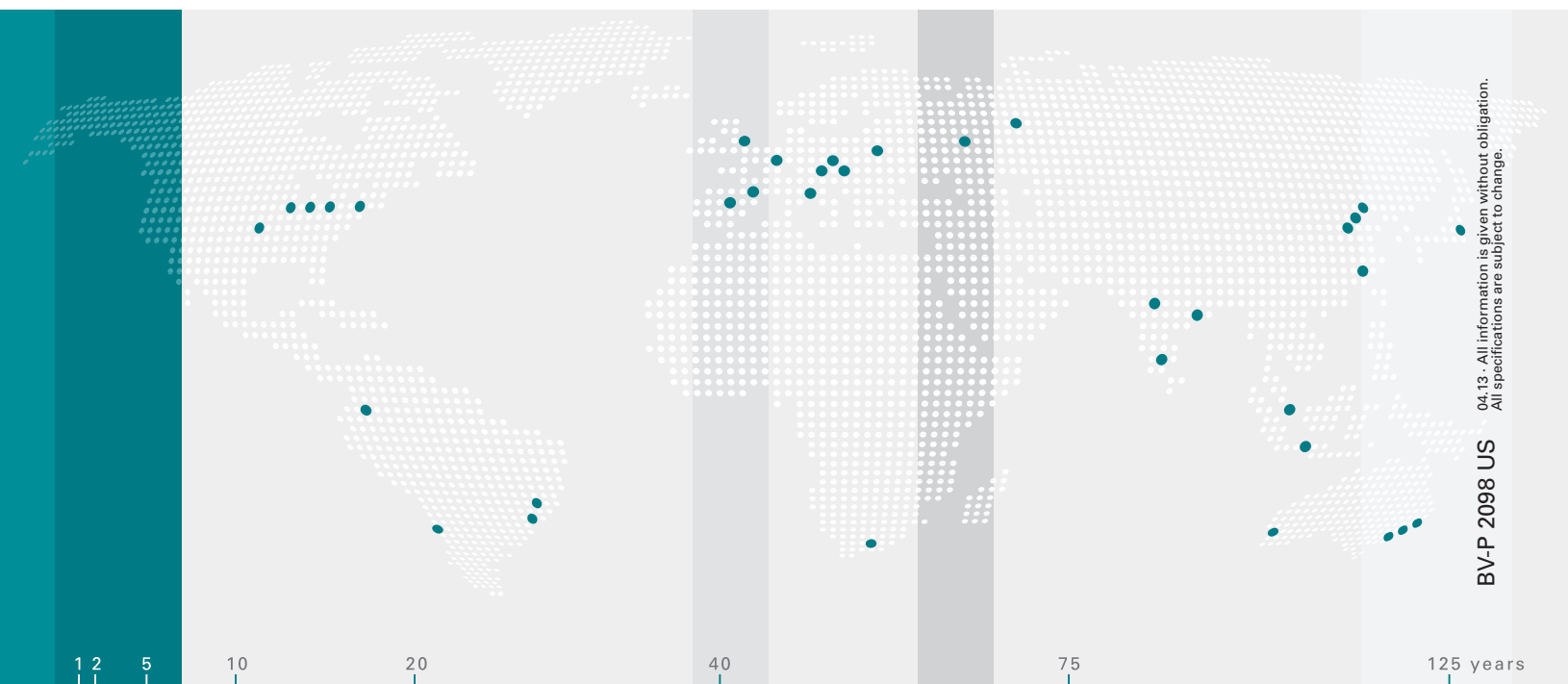
Our PASS service categories

PASS Repair

PASS Inspection

PASS Management

PASS Support



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All specifications are subject to change.

The Schenck Process Group is the global market leader of solutions in measuring and process technologies in industrial weighing, feeding, conveying, screening, automation and air filtration technology.

The Schenck Process Group develops, manufactures and markets a full range of solutions, products and turnkey systems on the basis of combining process engineering expertise, reliable components and field-proven technology.

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we make processes work