

TAMTRON

WEIGH TO KNOW



WEIGHING AND DOSING IN THE HANDLING OF BATTERY MATERIALS

– What specific needs of battery industry should be taken into account

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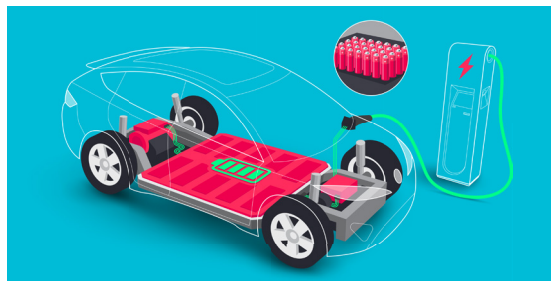




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Electrification progresses – Demand for batteries grows



The battery industry has become a major global field. The proliferation of electric vehicles and electrical appliances has increased the need for battery manufacturing, which in turn has increased the demand for the battery industry. Battery production is, in fact, forecast to increase up to 20-fold in the coming years.

The battery industry needs a variety of big bag handling equipment and dosing systems in the lithium-ion battery manufacturing process. These equipment and systems are important for the handling, storage and transport of cathode materials and precursors.

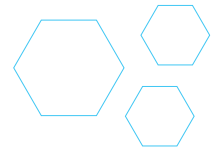
There is a need for big bag handling equipment and dosing systems at both ends of the battery life cycle, both in primary production and in recycling and reuse.

In primary battery production, big bag handling equipment and dosing systems help manufacturers process cathode materials and precursors of lithium-ion batteries efficiently and accurately. This equipment ensures the correct dosing rate and mixing, which are important for battery quality and performance. In addition, big bag handling equipment and dosing systems allow cathode materials to be stored and transported safely.

In battery recycling, big bag handling equipment and dosing systems help to separate discarded battery materials and components for reuse. This equipment ensures the correct handling and dosing of materials in the recycling process, which is important for efficient use of resources and minimizing environmental impact.

THIS GUIDE EXPLAINS:

- What equipment you need for battery handling processes
- What kind of know-how can make your processes more efficient
- What specific industry needs should be taken into account
- How the overall expertise of an equipment supplier can benefit you
- How the demands of society are changing the life cycle of batteries
- In which interfaces digitalization can benefit you



Raw materials in the focus of battery production

Lithium-ion batteries are the most common type of battery today, in part due to the growing electric car market, and the raw materials needed to produce them are at the heart of this. Currently, lithium, nickel, cobalt and manganese used in cathodes and graphite used as an anode material are the key raw materials for electric car batteries.

Changing battery technology leads to changing needs

Battery technology and chemistry are constantly evolving, and it is difficult to predict trends and needs. Lithium-ion batteries are more complex in technology and design than the old lead-acid batteries. This has created a new need for treatment and dosing systems.

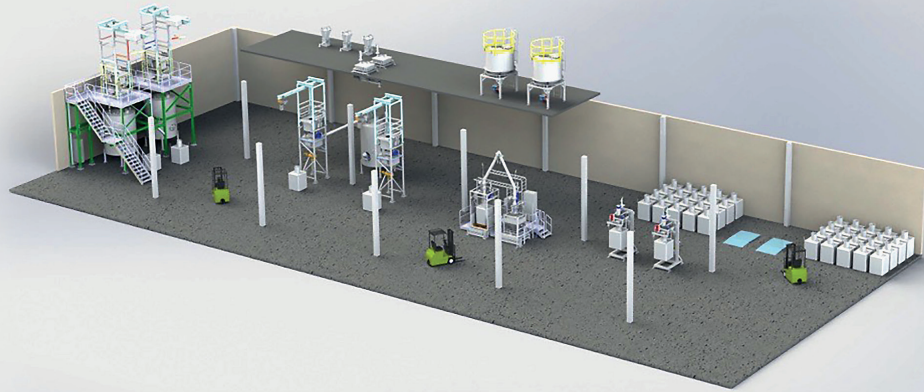
Equipment choices increase efficiency, safety and reliability

There are many steps involved in the manufacture of battery materials, and the efficiency, safety and reliability of these steps depend on the equipment and solutions used. The need for material handling solutions is particularly evident at the upstream end of production in virgin battery materials production. During the processes, there may also be a need to introduce auxiliary chemicals to improve the properties of the final product. There is also a need at the other end of the battery life cycle, where materials from unusable batteries are crushed for recycling and reuse.



Battery material plant equipment

- Receiving
- Dosing
- Slurrying
- Packaging



Big bag unloading to conveyor or mixing



Accurate dosing of bulk materials



Big bag loading



Accurate dosing of additives

Packing, unpacking and dispensing equipment to control interfaces

Due to the geographical location of the material sources, many battery raw materials are delivered in containers, drums, barrels, or large bags. Large bags are the most cost-effective and common. Bagging, packing, and unpacking stations are needed at almost all logistical interfaces where goods are received into the process or, reciprocally, where they are sent out of the process.

Many methods for material infeed

Material flows from the unloading station to the process are either transferred to an intermediate storage area to await dosing or fed directly into the process. Equipment is needed for dosing and material transfer. The nature of the process and the characteristics of the different bulk materials determine, to a large extent, the equipment requirements. The material is fed into the process utilising vibratory feeders, screw feeders, barrier feeders or various valve solutions using gravity, for example. Given its energy efficiency, it is recommended to use gravity as much as possible. The flow of fine materials can also be facilitated by fluidisation, where an air cushion is created between the material and the surrounding structures, and the fluidised material flows like a liquid.

Weighing is an essential part of the dosing process

An essential part of the material dosing process is weighing, which measures how much material is lost or how much is left. Therefore, accuracy and reliability in weighing are critical to ensure that the quantities are correct and that valuable materials are not wasted.

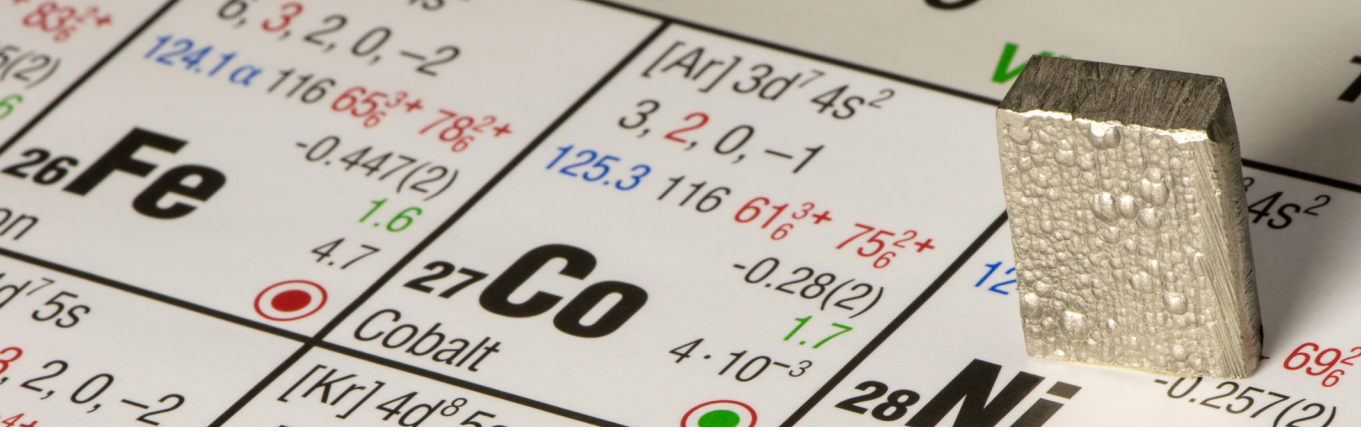
The weighing needs to determine the equipment

Industrial weighing measures either mass or change in mass. Dosing can be carried out incrementally, decrementally, or by loss-in-weight weighing.

Additive weighing takes place when the material is added, and the amount of material entering the process is weighed. Reducing weighing measures the loss of mass in the dosing device or the vessel above it. This indicates how much material remains to be added. In loss-in-weight weighing, the controller takes both into account. It measures the mass flow leaving the feeder and controls the dosing device to achieve the desired flow. The feed tank is filled as quickly as possible so that the volumetric feed mode activated during filling remains as short as possible.

The most common types of scales used for weighing in the battery industry are tank and cup scales. Almost as expected, the weighing is integrated into the dispenser. Logistics interfaces also use, for example, floor scales and truck scales as part of a complete system. Ultimately, the same material flow is weighed, starting with the raw material and continuing to the finished product.





Safe solutions for the battery industry

The practical process starts with packaging the material at the final production stage of the primary source. Since the minerals and their compounds used as raw materials for batteries are harmful or even life-threatening if inhaled, handling the material must be as dust-free as possible. When handling heavy materials, it is also essential to consider ergonomics so that manual work is carried out at the right height and does not require reaching.

Ventilation and insulation for a dust-free working environment

In practice, dust-free working means proper ventilation of the premises or insulation of the environment. When designing the equipment, it is necessary to decide how and at what level isolation and ventilation are to be implemented so that work is safe and healthy and the various occupational safety criteria can be met.

Personal protective equipment for workers also plays a part. Depending on the application and material, material flow isolation components such as special valves must be used for more hazardous materials. At times, the processing environment may need to be completely isolated, for example, by airtight enclosures, so that processing takes place in isolation from the clean operating environment.

Explosion risk to be taken into account in the design

Powdery materials to be handled may be highly dusty. For this reason alone, a risk assessment may indicate that the installation is in a potentially explosive atmosphere and is covered by the ATEX Directive. Only high-quality components and equipment should be used in equipment packages, as a matter of principle. This minimises the system's maintenance requirements and maintenance cost and also considers occupational safety factors. An experienced and comprehensive equipment supplier will select the right components to ensure that the equipment meets the requirements of the Directive and does not pose an explosion hazard.

A concept solution to block both risks and costs

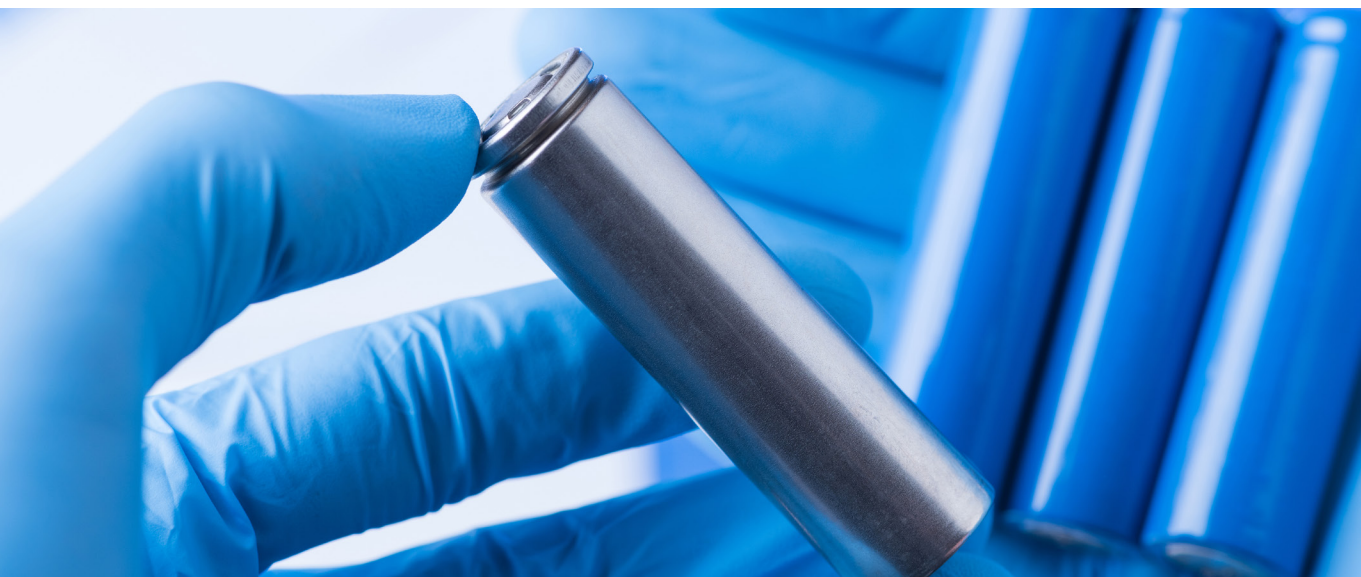
The battery industry has many characteristics, but its weighing and dispensing solutions are fundamentally not very different from those used in other industries. When looking for a partner, consider the supplier's experience and any existing concept solutions for industrial processes.

Tailor-made solutions on a ready-made basis

Each company's needs for total weighing and dosing solutions are unique. However, the more tailor-made a solution is, the more it will benefit the equipment user. As data has been collected on the performance of the solutions and they can be replicated, the total cost of ownership has also been stabilised. In terms of production quality assurance and monitoring and preventing errors, the increased level of automation allows, among other things, the control or blocking of material flows by the operator and various interfaces to higher-level systems such as control and production control systems.

Modularity speeds up processes and increases adaptability

Modular solutions allow a plant to be assembled from separate pieces, speeding up processes and improving quality. The battery industry has also seen a constant change in the composition and characteristics of the final product. Therefore, the plant or equipment layout should be designed as loosely as possible to facilitate changes and additions at a later stage.



Sourcing large packages from a single supplier – the “one-stop shop” tactic

The equipment for a system built around the weighing and dosing of materials should be sourced from a single supplier. This improves project flow and keeps investment and maintenance costs at a moderate level. After delivery, the necessary support is also more easily, clearly and quickly available from the same supplier. In the event of problems in production plants, it is worth its weight in gold to have a clear and easily accessible list of responsibilities and contacts.

Lifecycle and maintenance contracts reduce your maintenance

Weighing and dispensing solution suppliers often also offer a range of maintenance, spare parts and lifecycle contracts, allowing you to free up your own staff resources for core activities. At the same time, you can ensure that your plant investment is running efficiently, that the various periodic operations (maintenance, calibration, inspections) are carried out on time, and that you have the most modern equipment and the most up-to-date technology at your disposal.

One expert organization, overall responsibility

Extensive experience combined with weighing and dosing technology provides measurable added value.

Proven and reliable **cost-efficient** technology solutions.

Flexibility to provide system level or single equipment supplies.

Dust free solutions for processing hazardous materials.

Practical knowledge of **special metals** behaviour in industrial environment.

Expert resources for equipment **supervision** and **commissioning**.

Operator's **safety** and **ergonomics**.

Technology and components available for **ATEX**-classified environment.

The infographic features a central light blue hexagon with a dark blue border. To its left, three text blocks are stacked vertically. To its right, three text blocks are stacked vertically. In the top right corner of the blue background, there are three white hexagons of varying sizes arranged in a cluster.

New sectors are constantly becoming electrified, including container cranes and other types of cranes, mining technology and electricity storage, which in turn increases the need to recycle lithium-ion batteries.



Stricter environmental requirements are driving up the market for battery recycling

Lithium-ion battery materials can be recycled, significantly reducing the environmental impact of batteries. The recycling process involves crushing the battery and separating and processing the materials so that some can be reused as battery materials.

The EU is preparing a separate battery regulation

In the future, the various requirements for recycling battery materials will increase. The EU Commission has published its proposal for a battery regulation, which would require 65% of battery materials to be recycled by 2025 and 70% by 2030. Although battery recycling is still a relatively small market, it is estimated to be worth €19 billion globally by 2030. Also, material handling and weighing expertise will add value to companies in battery recycling. The environmental responsibility of the battery industry can be increased by improving the energy efficiency of production plants and by preventing material waste in production plants.



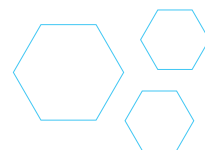
A digital service allows you to use up-to-date stock level information as a natural part of your mass-based material flow management.

Digital weighing services to support the whole

The industry's digital transformation is progressing rapidly, and digital solutions are already available for the logistical interfaces of the battery industry process. These solutions enable material to flow into and out of the process to be captured, and the resulting data can be made available to all business systems.

The digital choice is always responsible for increasing the traceability of materials and providing direct data reporting without the risk of human error.

Digital services improve the overall efficiency of the business. In the future, weight-based material flows will be seamlessly captured, controlled and utilised by the same application, with no in-process "grey area" in between.



Ask our expert for more information!

We will gladly tell you more about weighing or dosing solutions for the battery industry. We can harness decades of experience in weighing, dosing and bulk material handling for your benefit, whether you are producing batteries or recycling them.



Contact us

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Tamtron is a leading provider of advanced weighing solutions consisting of innovative weighing and dosing technologies, lifecycle services and modern cloud-based digital services. Tamtron's solutions help customers in more than 60 countries work more efficiently in all major industries, including construction, mining, wood processing, waste treatment and recycling, ports, transport and logistics, process and manufacturing. In addition, Tamtron offers its customers comprehensive lifecycle services, including verification and calibration services, maintenance, repair and spare parts for scales.

Tamtron has two offices in Finland, a head office in Tampere and a unit in Lahti, as well as subsidiaries in eight European countries. In addition, the Group's solutions are provided through a global network of partners in more than 50 countries. The Tamtron Group employs approximately 270 people in Finland, Sweden, Norway, Denmark, Germany, the Czech Republic, Slovakia, Poland and Estonia.