

Future-oriented
technology
for wet grinding
and dispersing
processes.

The Bühler Group

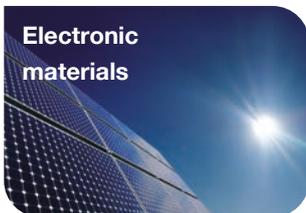
Every day, billions of people come into contact with Bühler technologies to cover their basic needs for food and mobility. Global producers and processors of grain, pasta, chocolate, and breakfast cereals rely heavily on us. Furthermore, Bühler is a leading solution provider of die-casting and surface-coating technologies in high-volume application areas.

Key facts:

- Nearly 11,000 employees
- More than 90 service stations and 30 manufacturing sites worldwide
- Over 2.5 CHF billion turnover



Engineering customer success. **Bühler is your trusted partner.**



In all industries where wet grinding and dispersion are key processes, Bühler demonstrates a comprehensive know-how and the ability to deliver tailor-made solutions for complex processes. With over 90 years of experience, we have established a profound expertise and a broad customer base.

Our global team provides full support in all phases of your project and beyond. This includes that we plan everything from the very beginning in close collaboration with you.

To establish the optimal production process, our labs offer the possibility for individual product testing. During installation, our experts on-site ensure a smooth commissioning. Later on, we continue our support by offering comprehensive services during the entire lifecycle of your equipment and plants, naturally in the form of a customized service package.

From single machines to entire plants

We cover the whole process chain of wet grinding and dispersing. Depending on your product and needs, we design, plan and build your specific solution. Whether it is a single bead mill, an embedded system or a full plant from material intake to packaging of the finished products.

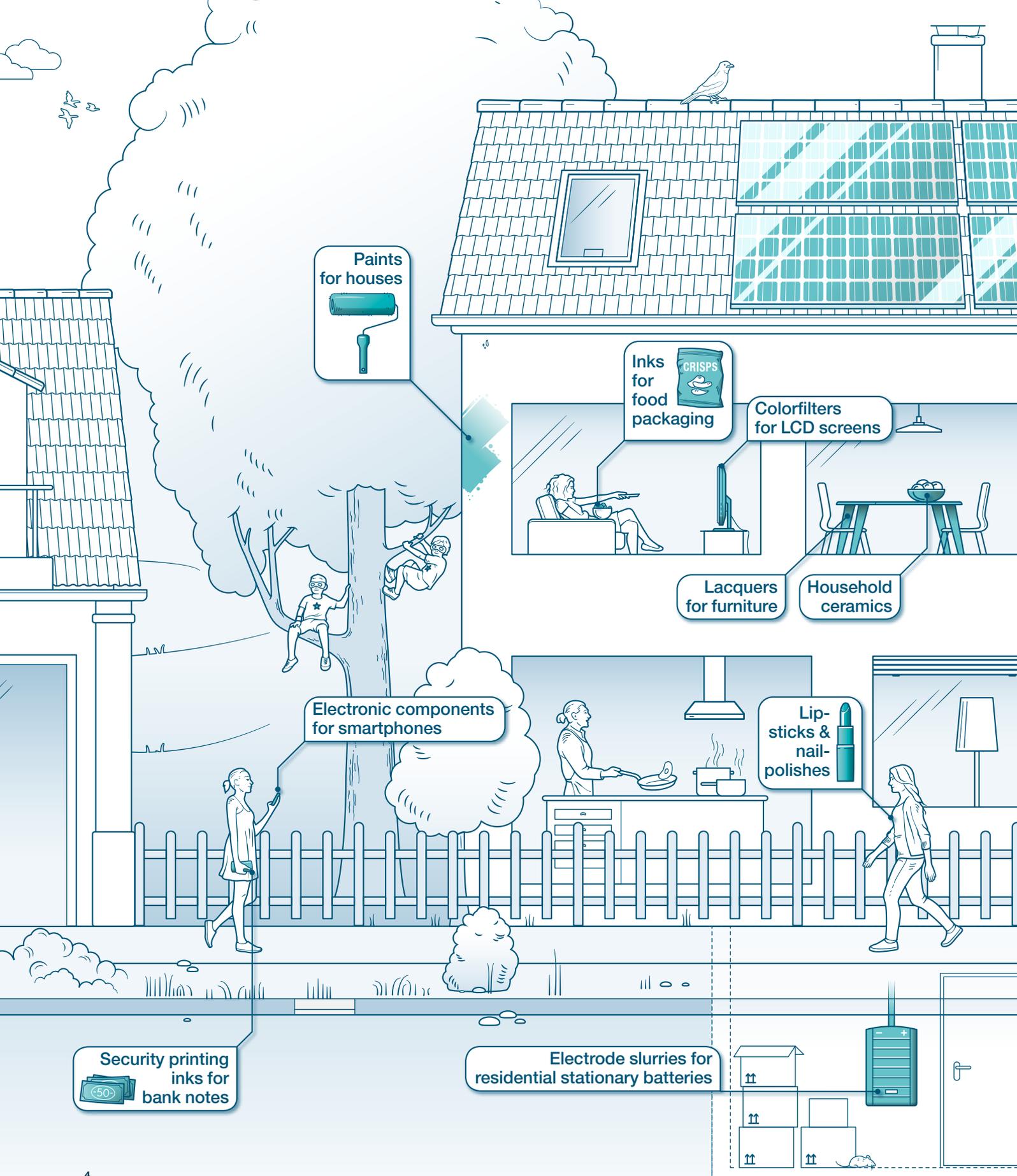
From lab solutions to large-scale production

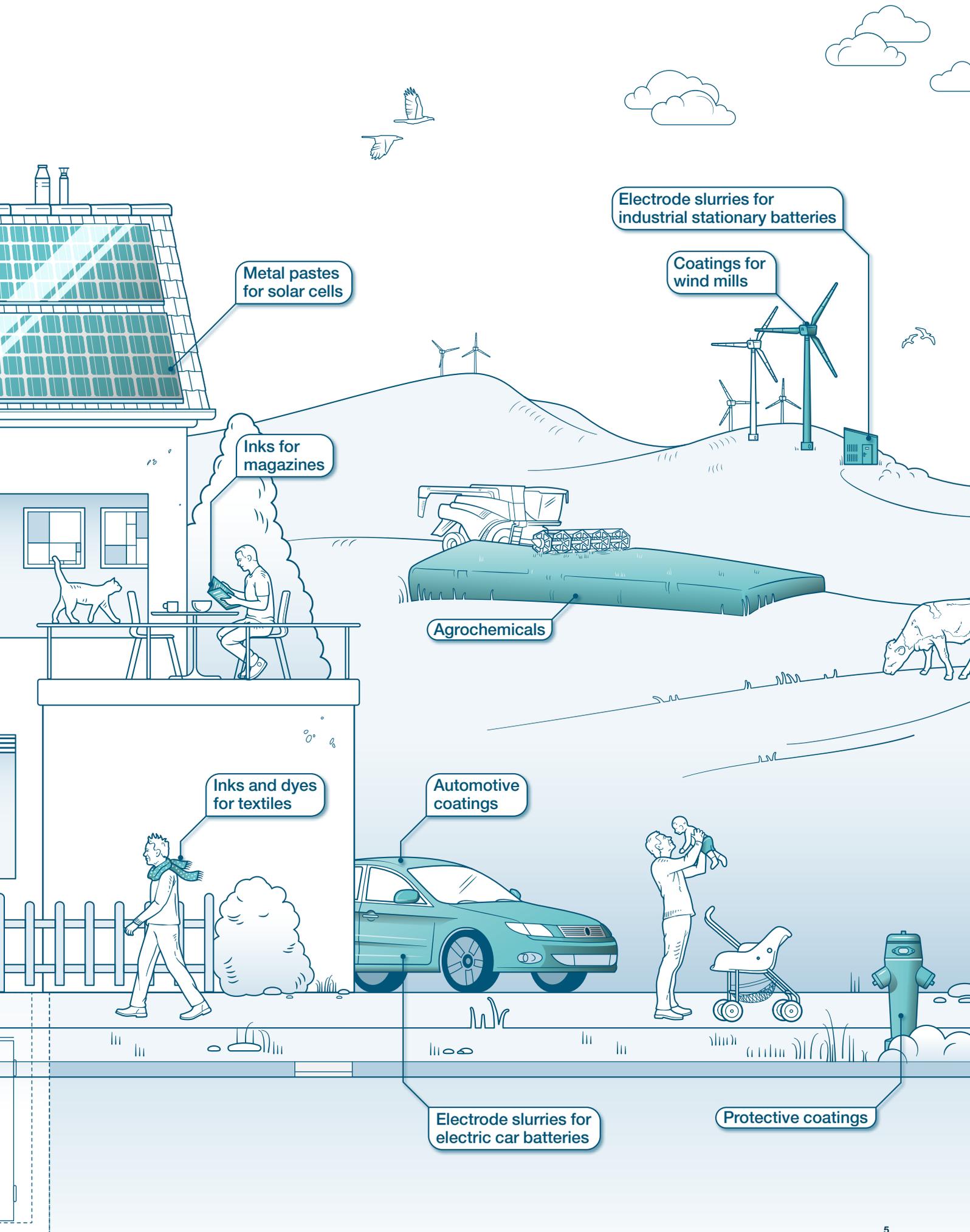
Whether you are looking for a bead mill with an active chamber volume of 0.07 l or 1,000 l, we offer equipment for all sizes. Our lab solutions allow an efficient product testing, while the large-scale machines, such as the Centex T5, are ideal for big volumes.

From manual operation to fully automated plants

Depending on your needs and requirements, either a manual process or a fully automated plant control system is suited best. In collaboration with you, we define the optimal automation level. Additionally, we offer IoT solutions with various features, such as automatic alerts, location- and device-independent access and control as well as intelligent data analyses.

Our grinding and dispersion technology is everywhere.





Metal pastes for solar cells

Electrode slurries for industrial stationary batteries

Coatings for wind mills

Inks for magazines

Agrochemicals

Inks and dyes for textiles

Automotive coatings

Electrode slurries for electric car batteries

Protective coatings

Bühler wet grinding and dispersing equipment. **Top-class solutions for safe processes.**



MacroMedia pre-dispersing unit

The combination of a high-performance pump and small-volume grinding unit makes the MacroMedia unique on the market.

- Improved process control
- Reduced downtimes, greater process safety
- Increased plant capacity when upsizing
- Better material yield leads to more profit



MicroMedia Invicta bead mill

The MicroMedia Invicta provides the next step change in bead mill technology with innovative processing unit design and a new bead separation system.

- Cutting-edge technology for better product quality
- Maximum energy efficiency due to smaller beads and highest power density
- Wide range of process chamber materials tailored to your needs



Cenomic and Centex bead mill

Leading companies have been relying on the Cenomic and Centex technology and its proven horizontal bead mill design for many years.

- Minimized specific energy requirement
- Higher productivity due to smaller mill volume
- High flow capacity
- Entire machine family from 0.22 to 1,000 l available



Trias three-roll mill

Trias is designed for meeting high quality demands while enabling convenient and easy operation as well as quick cleaning at the same time.

- Maximum throughput
- Repeatable, constant product qualities
- Outstanding cooling capacity
- Safe and easy operation



SD-Series and Trinomic fully hydraulic three-roll mill

Bühler's fully hydraulic three-roll mills are suitable for a wide range of medium to high viscosity products and meet the highest quality demands.

- Wear-resistant rolls
- Outstanding cooling capacity
- Safe and easy operation



PML 2 lab bead mill

The PML 2 platform with its interchangeable process units presents the optimal solution for the development of innovative wet grinding processes.

- Wide range of applications due to modular design
- Modules for full volume, annular chamber and nano mill
- Reproducibility of test parameters
- Various materials for process units

Customer success story. **Engineering: Fine Chemicals Nigeria Ltd.**



Thanks to a complete solution from Bühler, Fine Chemicals Nigeria is able to produce liquid inks with higher quality and reduced loss of material. It is Africa's first semi-automatic ink factory and has helped Fine Chemicals to become the market leader in Nigeria.

The company currently produces about 300 tons of ink per month and provides solutions for some of the world's most recognizable brands. As quality and efficiency demands increase amongst the rising middle class customer base, Fine Chemicals Nigeria has made modernization its priority.

Fine Chemicals Nigeria has chosen a complete Bühler solution, from powder and liquid handling, mixing and grinding, to the letdown station, which went into operation in 2015.

Thus, a new era of printing ink manufacture has started not only at Fine Chemicals, but also in the country as a whole, and even across the continent, for this is Africa's very first semi-automatic printing ink production line of its kind. And it delivers right from the start what Bühler has promised.

The output of Fine Chemicals increased about twofold, and the quality of the ink is outstanding and meets international standards. Also, the evaporation of the difficult to handle solvents is a thing of the past. "Together with Bühler, we have transformed our vision into reality and are now the market leader in Nigeria," says Rajeev Samant, Production Manager at Fine Chemicals. Samant.

Today, the company is already preparing for the next big leap: Thanks to its enhanced process expertise, Fine Chemicals is now expanding its range of action, for instance by launching new formulations for cardboard printing applications.

Customer success story.

Process development: Lishen China.

Lishen and Bühler cooperated in the development of a continuous mixing process for electrode slurry, which is a core battery component. The revolutionary solution has been designed to cut production costs on a sustainable basis and to achieve a better quality.



Lithium-ion batteries from the Chinese manufacturer Lishen can be found in all sorts of devices, from smartphones to wearables and notebooks. The next major field of application for Lishen is energy storage systems for electric vehicles. The company has been joined on this venture by the Bühler Group to redefine the manufacture of electrode paste by introducing a new process.

The innovative solution, in contrast to the commonly employed batch process, is a continuous method designed to reduce initial investment costs, production costs and to achieve a better quality.

Due to the combination of various process steps, such as mixing, homogenizing, dispersing, and degassing into one unit, only a fraction of the footprint of a conventional slurry preparation is required. As some of the materials used are

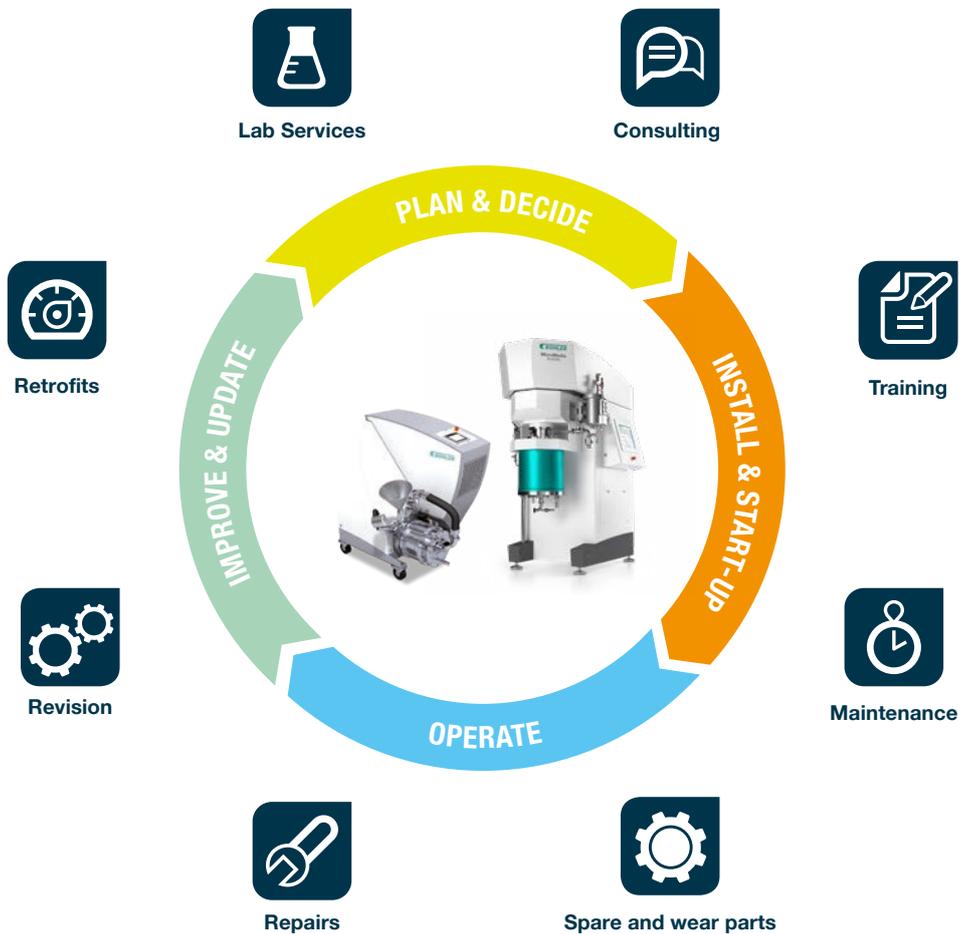
sensitive to air humidity and the production environments are designed as dry rooms, the reduced space requirements ultimately result in lower overall costs.

In 2018, Lishen puts three new battery factories in operation in China. All of them are equipped with Bühler mixing technology. Their total electrode slurry production capacity corresponds to more than 10 GWh per year, which is equivalent to several hundred thousand car batteries per year.

Lishen and Bühler cooperated in the development of a continuous mixing process for producing the core battery component, the electrode slurry, which is unique on the market. It is designed to sustainably reduce initial investment costs, production costs and to achieve a better quality.

Bühler services.

Competent, reliable and customized.



Lab services

Bühler test centers with pilot facilities offer you highest standards and state-of-the-art technologies. Our experts carry out performance tests to determine the correct machine size and operating parameters for your production. In order to achieve representative results, we run trials with your own raw materials.



Consulting

Act today to ensure a successful tomorrow: Our consulting services provide you a decisive competitive edge for the future. Our expert consultants will work together with you to define your requirements, analyze your existing processes, offer you in-depth advice and implement the optimum solution for sustainable success.



Training

Take advantage of the full potential of your plant by having your operators and maintenance crews well-trained. We offer an extensive range of training and continuing education opportunities, either locally at your own site or at our worldwide training centers.



24/7 worldwide.

Whenever you need support we will be on site quickly: We maintain our own service locations worldwide and are widely represented on every continent.

Our technicians procure spare parts without delay and install them professionally, while specialized Bühler workshops carry out extensive repair work and retrofits.



Spare and wear parts

We can deliver Bühler original parts, including mechanical, electrical and electronic components, anywhere in the world and within a very short time – guaranteed by our well-maintained stock of spare parts, our comprehensive distribution network and our expert customer service operators.



Repairs

Our skilled experts around the world stand ready to help in the event of a machine breakdown. Our closely-knit network of service stations ensures that a specialized technician rectifies your problem as quickly as possible.



Revision

Recreate the productivity and quality of your machine as on its very first day of operation. We offer a range of revision packages, ranging from basic service to full overhauling – tailored to your specific needs, of course.



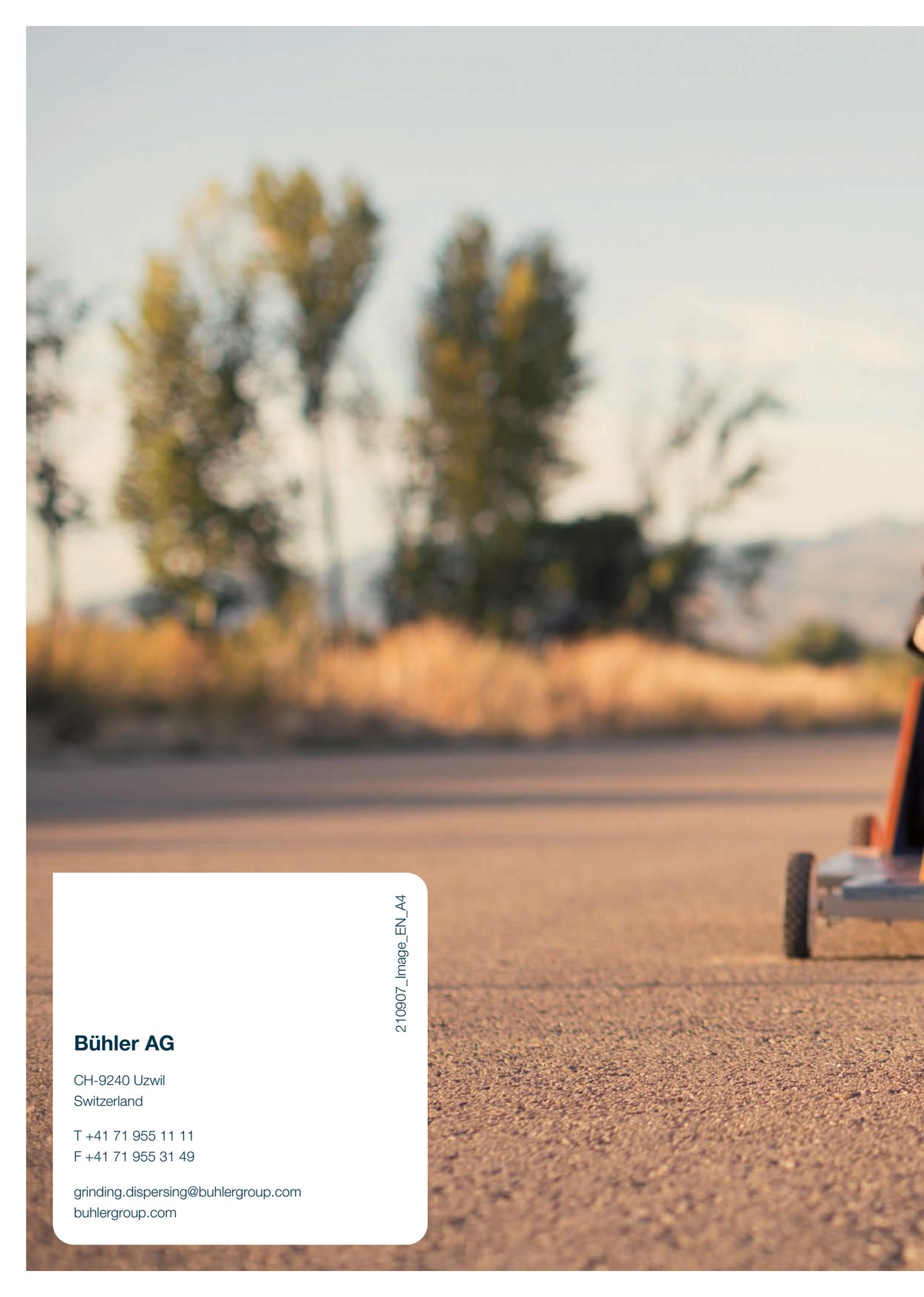
Retrofits

Upgrade your equipment with Bühler retrofits to the latest technology standards. Proven, reliable and affordable, they represent an investment in your future with a guaranteed return.



Maintenance

Even the most robust and reliable equipment needs regular maintenance. We offer proven maintenance service, customized to your needs. After comprehensive consultation and analysis we specify the exact range of services required and develop an individualized service contract that fits your operational requirements.



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