BST
an eLEXIS company

Efficient. Sustainable. Economical.

BST Inline Quality Assurance for the Battery Industry

Perfecting your performance

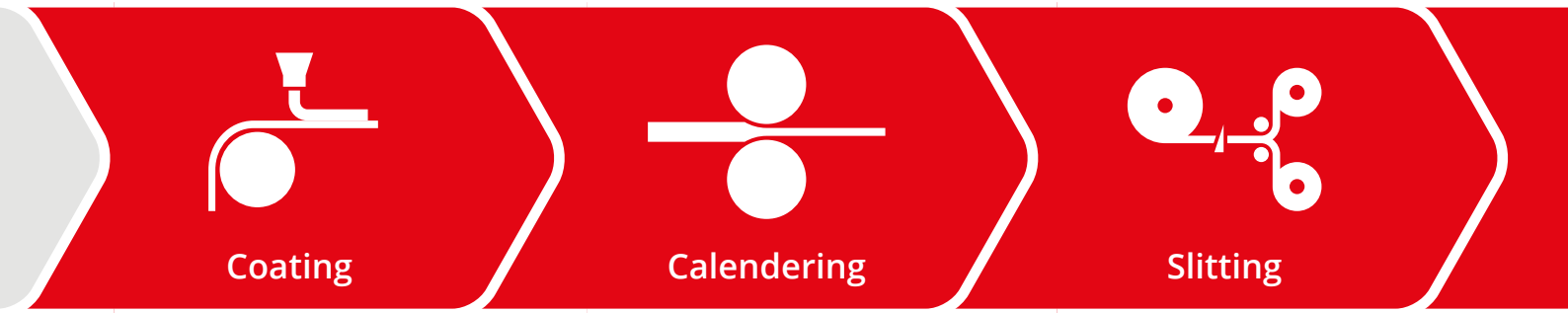
Future-ready battery manufacturing
Quality assurance systems that deliver results

Focus on sustainability: For years now, the global demand for electrochemical storage systems has been increasing, particularly in the context of e-mobility. At the same time, the demand on battery cells continues to rise. Long battery life and high performance are essential for successful battery use. The heightened price war does not tolerate any flaws in the production process.

Maximum precision right from the start: To manufacture safe, competitive, and high-performance batteries on an industrial scale, work must be done with the highest precision possible. Inline quality assurance that sets precedent for top results at all roll-to-roll processes is the key to reliable first-class products.

Perfecting your performance: Battery manufacturers benefit from result-oriented, comprehensive quality assurance for more efficient production when they partner with BST. We understand what is important to you as a leading full-service provider of quality assurance systems for web processing industries: fewer rejects, higher production speeds and maximum quality.

Our solutions for the battery industry



- Web Guiding
- iPQ-Surface^{ENERGY}
- BST COATINGControl
- Heavy Edges Inspection

- Web Guiding
- iPQ-Surface^{ENERGY}

- Web Guiding
- iPQ-Surface^{ENERGY}
- BST SLITTINGControl
- Burr Inspection

Inline quality assurance

Efficient and modular Adapted to your needs

With BST, you choose efficient, modular quality assurance that starts where you need it. Our comprehensive range of solutions ensures that specifications are met with absolute precision at every stage of production. Surface or edge inspection, web guiding, electrode geometric measuring, or closed-loop solutions for proactive defect prevention: With BST, you minimize scrap and optimize your added value. For high-end production which is also environmentally friendly.

Separating

- Web Guiding
- iPQ-Surface^{ENERGY}
- CELLInspection
- SEPARATINGControl (CELLInspection)

Cell-Assembling

- Web Guiding
- iPQ-Surface^{ENERGY}
- CELLInspection
- ASSEMBLINGControl (CELLInspection)

BST Web Guiding

Flexible installation
High-precision guiding

BST systems carefully manage the web run in all roll-to-roll process steps of battery production and ensure that the treated material is precisely in its prescribed location.BST web guiding systems effectively minimize scrap and downtime while utilizing the maximum line speed.

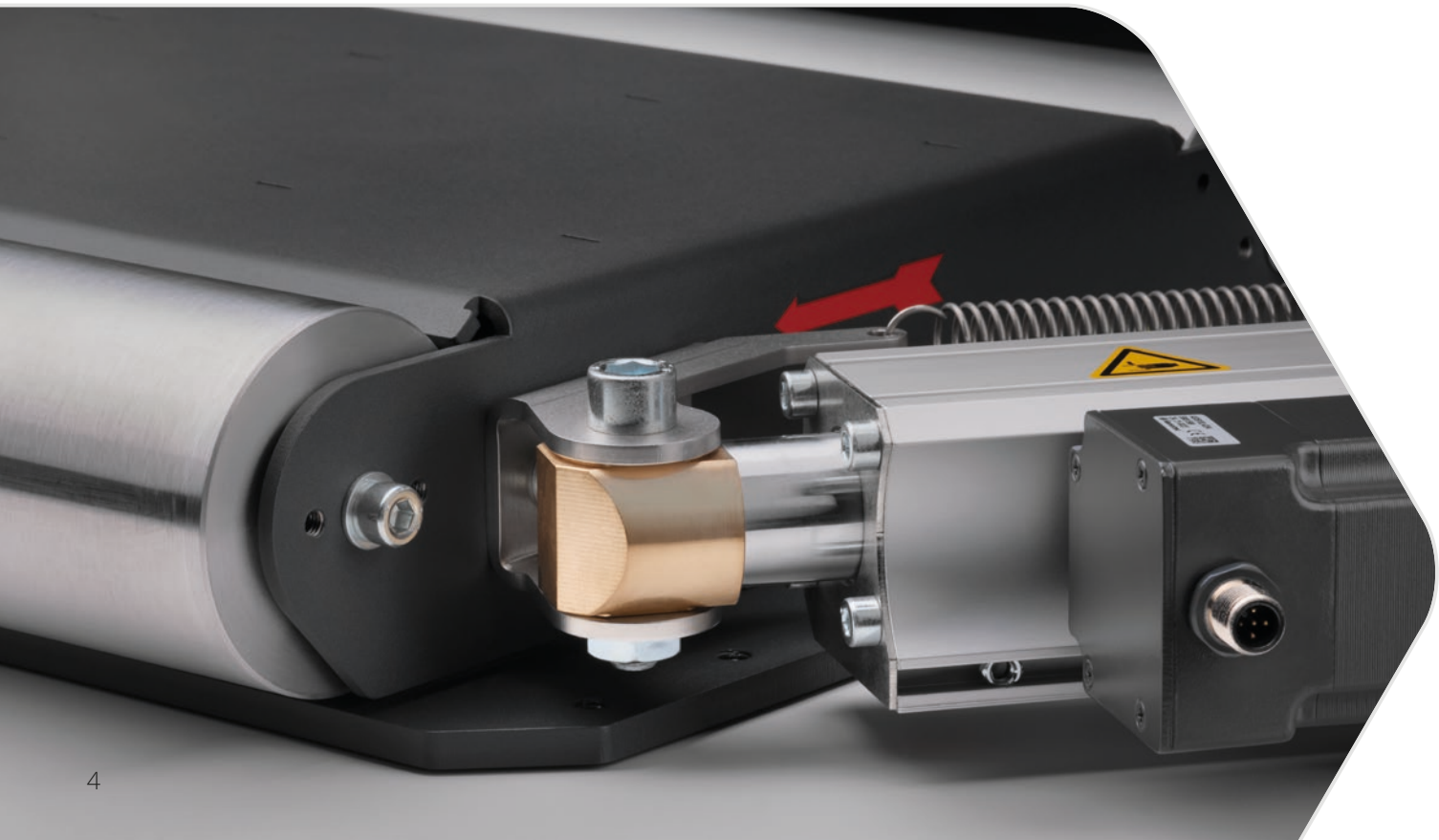
Our highlight: BST FRAMEGuide Pro. The system scores points with exceptional guiding accuracy, which exceeds today's standards. The exclusive design allows lowest possible height for easy integration, even in the most confined spaces.

Your advantages:

» Highly precise and reliable guiding results with a repeatability of up to ± 10 µm
» Compact design allows for simple machine integration
» Minimized scrap and machine-downtime
» Simple integration regardless of the machine manufacturer
» Intuitive operation

Equipment:

» Reliable guiding by web edge (epc) or web center (cpc)
» Suitable for use with all web edge sensors (optical or ultrasonic)
» Cross-system and cross-process data exchange possible (SMARTData see page 9)
» Manual sensor adjustment
» Remote control via digital inputs (digital I/O)
» Optional: high-performance drive for maximum precision
» Optional: motor-driven sensor adjustment



BST COATINGControl

Precisely positioned Flawless coatings

BST COATINGControl ensures that your coating is perfectly positioned on the top and bottom of the substrate. Modern line scan cameras, or CIS technology, as well as powerful and sophisticated edge detection, form the foundation for the most accurate coating results.

Your advantages:

» Avoid scrap and plant shutdowns thanks to 100%, real-time measurement
» perfect coating position without manual intervention
» Maximum product quality as a result of the highest control accuracy
» Avoid operating errors with the intuitive interface
» Simple integration regardless of the machine manufacturer

Equipment:

» Image processing algorithms for robust edge detection and simultaneous width measurement for wet and dry coatings
» Web material stabilization
» Cascade control (for BST winding and web guiding systems) to avoid stress and wrinkling of the material
» User-friendly touch screen operation
» Different camera options
  › CCD Line-Chip-Camera
  › CIS-Technology
  › iPQ-Surface^{ENERGY} (see page 8)
» Robust high resolution calibration (optional: certified calibration reference)
» Data and machine interface (SMARTData see page 9)

BST SLITTINGControl

Perfect alignment Perfect cuts

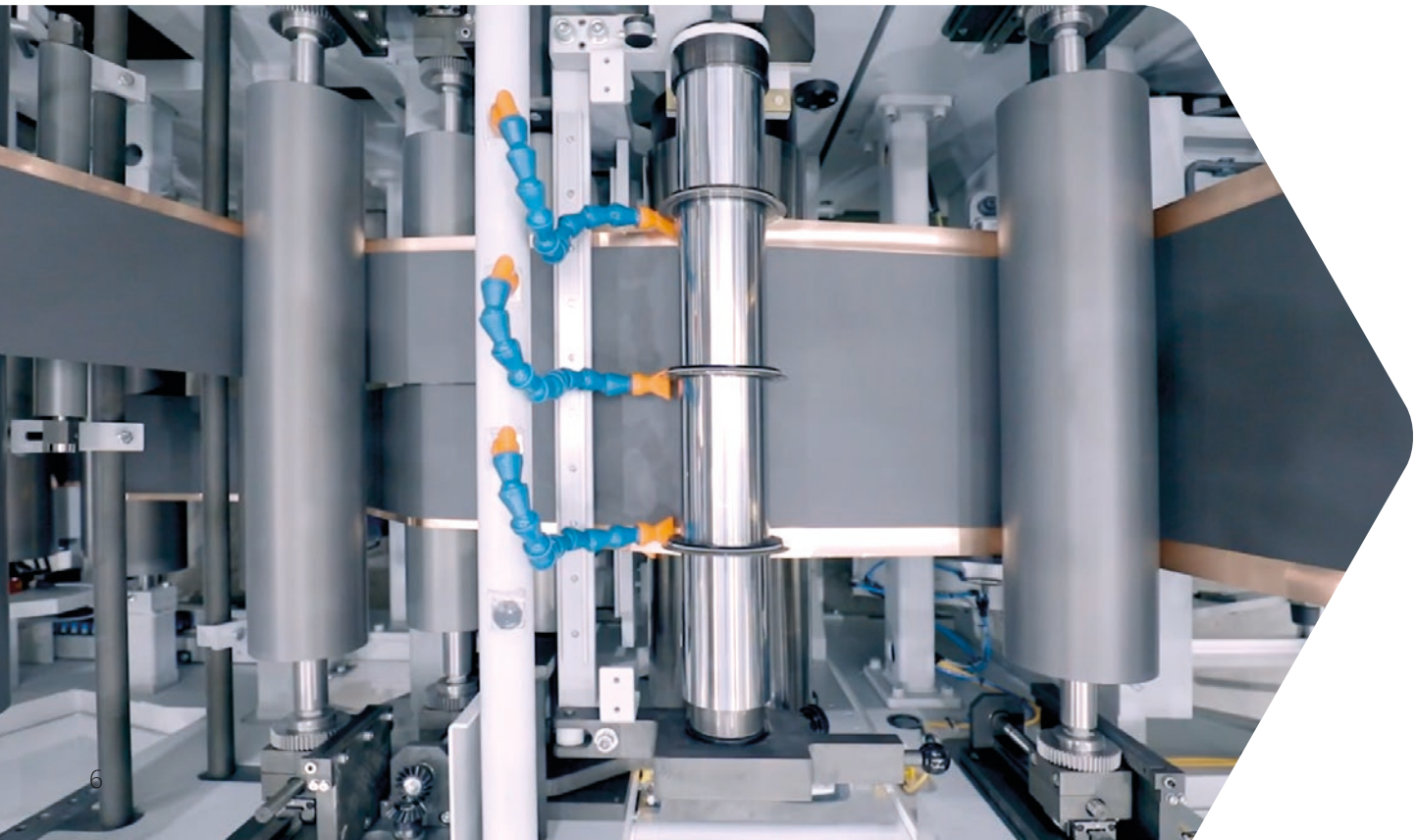
BST SLITTINGControl is the solution for optimum and uniform cutting results. The system measures daughter rolls and coatings and compares actual and target values. When partnered with a BST web guiding system such as FRAMEGuide Pro, this allows for highly accurate and automated corrections to be made before quality issues arise.

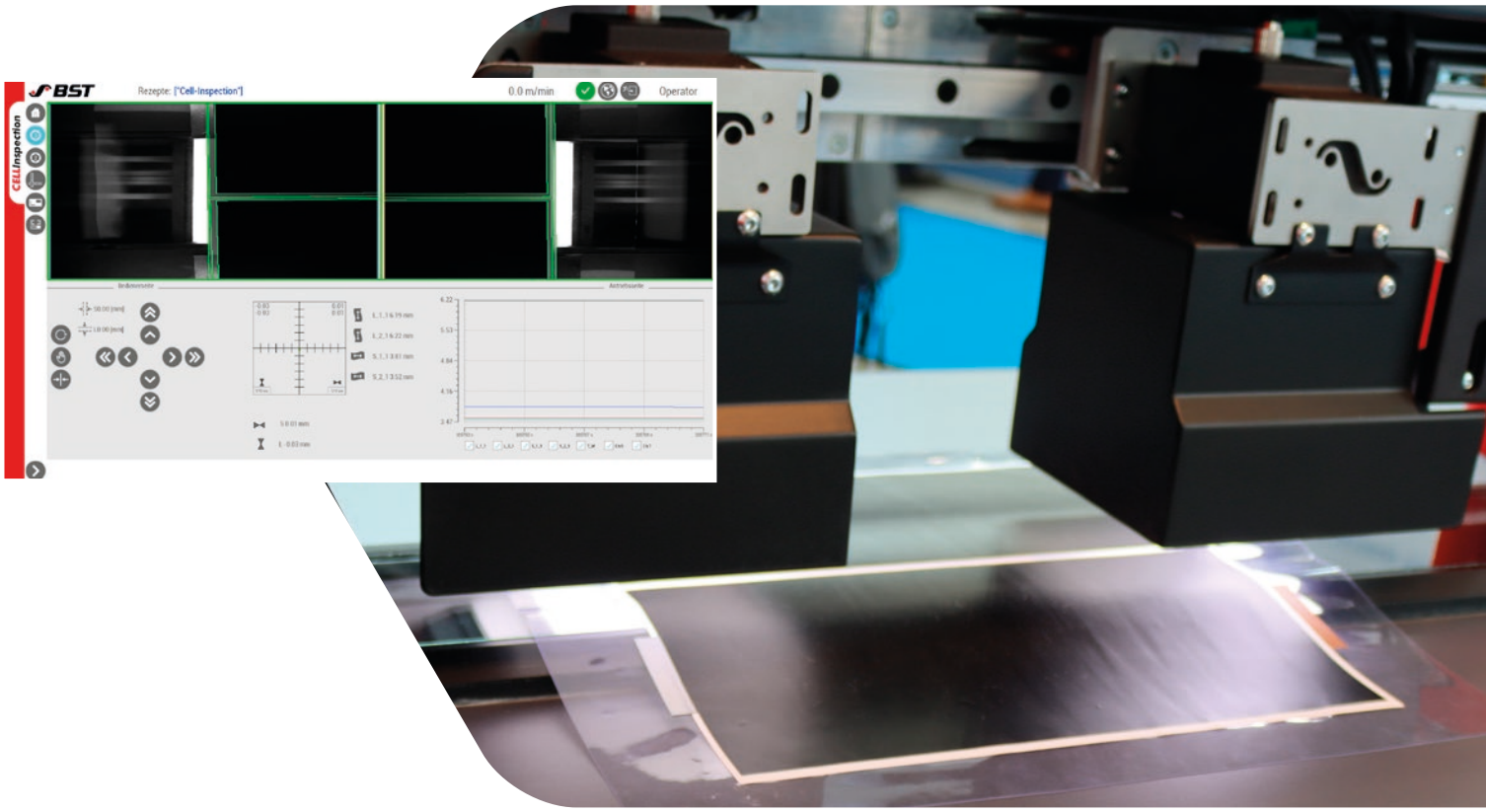
Your advantages:

» Avoid scrap and plant shutdowns thanks to 100%, real-time measurement
» perfect cutting position for coating without manual intervention
» Avoid operating errors with the intuitive interface
» Simple integration regardless of the machine manufacturer

Equipment:

» Image processing algorithms for robust edge detection and simultaneous width measurement
» Web material stabilization
» Cascade control (for BST winding and web guiding systems) to avoid stress and wrinkling of the material
» User-friendly touch screen operation
» Different camera options
  › CCD Line-Chip-Camera
  › CIS-Technology
  › iPQ-Surface[ENERGY] (see page 8)
» Robust high resolution calibration (optional: certified calibration reference)
» Data and machine interface (SMARTData see page 9)
» Optional: top-to-bottom measurement and averaging of the cutting position





BST CELLInspection

Exact layers Perfect geometries

BST CELLInspection, as an inspection system for geometric measurement of single and laminated cells, presents optimal conditions for future system expansions. BST CELLInspection precisely measures all quality-relevant geometries of different cell types (round, prismatic, pouch) before cell assembly. The innovative and intelligent illumination concept detects and measures the position of up to four layers at the same time.

Your advantages:

- Avoid plant stops with precise inline geometry measurement
- Operational and process reliability through live image and real-time measurement data
- Manual corrections are not required thanks to 100% measurement
- Intuitive operation
- Simple integration regardless of the machine manufacturer
- Format flexibility provided by optional motorized camera positioning

Equipment:

- High resolution matrix cameras
- Individual lighting concepts
- Easily integrable image processing system
- User-friendly touch screen operation
- Optional: high-precision motorized camera positioning

BST iPQ-Surface^{ENERGY}

100% Quality
From coating to cell-assembling

BST iPQ-Surface^{ENERGY} has been developed specifically for applications in battery cell production of the electrode material in all production phases and regardless of the machine manufacturer. Your advantage: less scrap, increased sustainability and enhanced process efficiency.

Coating

- 100% inspection of the coating surface with an additional inspection of the carrier foils (copper and aluminum)
- 100% inspection of coating edges for regularity, smearing and breakouts
- Synchronous measurement of the alignment and position of the coating on the top and bottom sides

Calendering

- 100% inspection of the surface before calendering: detection of agglomerates and wrinkles with real-time control of calender rolls (lift-off)
- 100% inspection of the surface after calendering: e.g. detecting chipping at the edges or within the coating, unwanted inclusions, pinholes and decontamination

Slitting

- 100% inspection of top and bottom side after cutting: detection of cutting dust, cutting waste, chipped coating or burr residues
- 100% synchronous measurement of the coating and cut widths from top to bottom side

Separating

- 100% inspection of contaminating microparticles and cutting dust on top and bottom side after punching, lasering or cutting
- Controlling the discharge of faulty electrodes
- Reading of 1D and 2D codes (including DMC, QR, barcodes) for tracking purposes

Cell-Assembling

- Final inspection for defect-free surfaces and edges of the electrodes, controlling discharge signals
- Inspection of separator foils

Your advantages:

- High-precision surface inspection with simultaneous geometric measurement ensures maximum quality and functionality
- Reduced scrap due to intelligent and adaptive error classification
- Optimized plant efficiency
- Reduced plant costs (or expenses)

Equipment:

- Image capture at high speeds for optimum precision, even at the highest web speeds
- Multiplex illumination for optimum defect detection
- Reliable and intuitive software optimized for Industry 4.0 environments (SMARTData see page 9)

SMARTData

Stay one step ahead
Position-accurate quality data tracking

Welcome to the world of SMARTData, where the digitalization of battery cell production offers enormous potential for optimization to meet high quality demands while producing cost-effectively. With data-driven processes, production can become more sustainable, and quality can be improved by controlling processes to minimize waste.

The basis for aggregating the data required for this in battery cell production is the accurate location of data. Our approach to position-based mapping of quality characteristics and process parameters in continuous production processes enables a variety of use cases in the field of digitization.

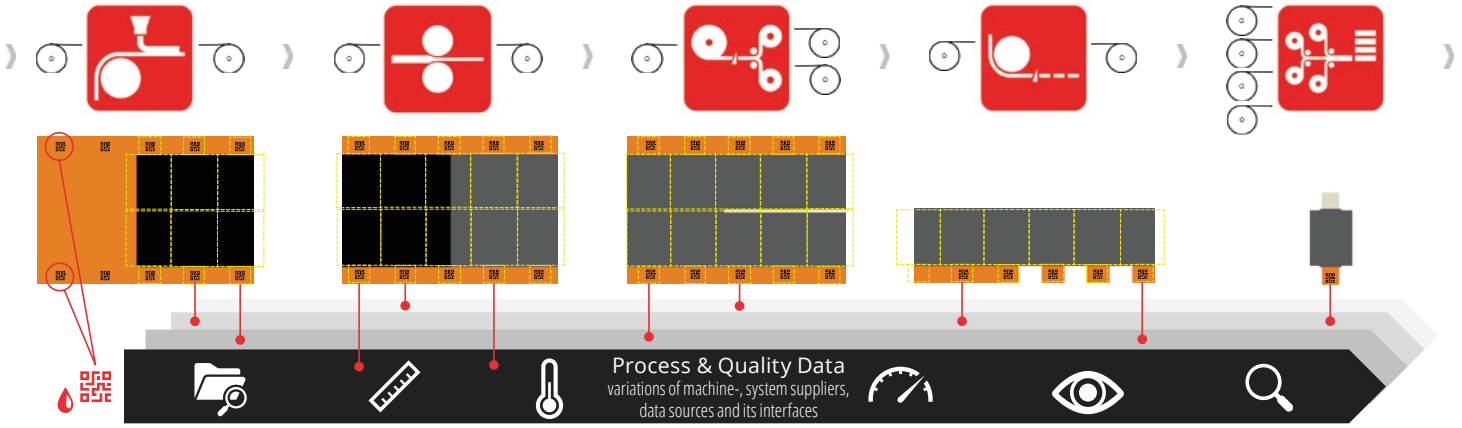
The position-accurate documentation of quality data creates transparency beyond the boundaries of the process, thus facilitating process optimization and enabling the exploration of cause-and-effect relationships between electrode production and cell performance. This increases your understanding of the process and creates the basis for a digital twin at electrode level.

With SMARTData, you take control of your battery cell production and optimize it to achieve high quality output while minimizing waste.

Join us on the path to a more sustainable future.

Your advantages:

- Multi-vendor process and quality data synchronization
- Open interfaces for sensors, QA systems or individual production machines
- Cell position accurate data available within each individual production process
- Bi-directional deterministic data exchange between production processes
- Central (cloud) data storage for all linked data from multiple process steps
- Interfaces with upstream and downstream (discrete) production processes and ERP systems



BST Service

Service that exceeds your expectations Perfects your performance

BST service is always focused on perfecting your performance. We are one hundred percent committed to this. Worldwide and at all times. In partnership and at eye level.

From initial consultation, installation, commissioning and maintenance to spare parts procurement, modernization and retrofitting.

In addition to our standard services, we offer comprehensive material testing, as well as complete solutions for machine analysis and evaluations in battery production that are adapted to your individual needs.

Our machine analysis includes:

- Identifying process weaknesses
- Planning the machine analysis
- Adding necessary measuring-systems for an analysis into the process
- Process data recording
- Data analysis
- Final report
- Optimization recommendations
- Implementation of optimizations

Your advantages

- Reduce costs
- Increase process output
- Reduce scrap
- Save energy

The BST service at a glance:

- Competent support in the entire product life cycle
- Global service network with experts on every continent
- More than 60 years experience
- More than 100 responsive, experienced service technicians in the field
- Solution-oriented support - onsite and via remote maintenance (BST Helpdesk)

Your advantages

- Minimized machine downtime
- Maximum productivity
- Smooth process flows on reques

Your advantages at a glance

That‘s why BST: Innovative solutions for optimal efficiency and quality

BST provides much more than exceptional products. As a strong partner for reliable quality, we are dedicated to impressing your customers with flawless performance. Our solutions derive the maximum out of your production and provide you with a distinct competitive advantage.
Reasons to rely on BST in battery production:

Maximum quality
by ensuring optimal precision throughout the manufacturing process

Minimum scrap
due to proactive error prevention, which also benefits the environment

More efficient processes
through consistent digitization and high-precision inline quality assurance

Optimized overall plant efficiency
thanks to short setup times and avoidance of plant stops

Lower costs
through modular systems and economical battery production

Proactive development
with innovative products that address tomorrow‘s challenges today

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