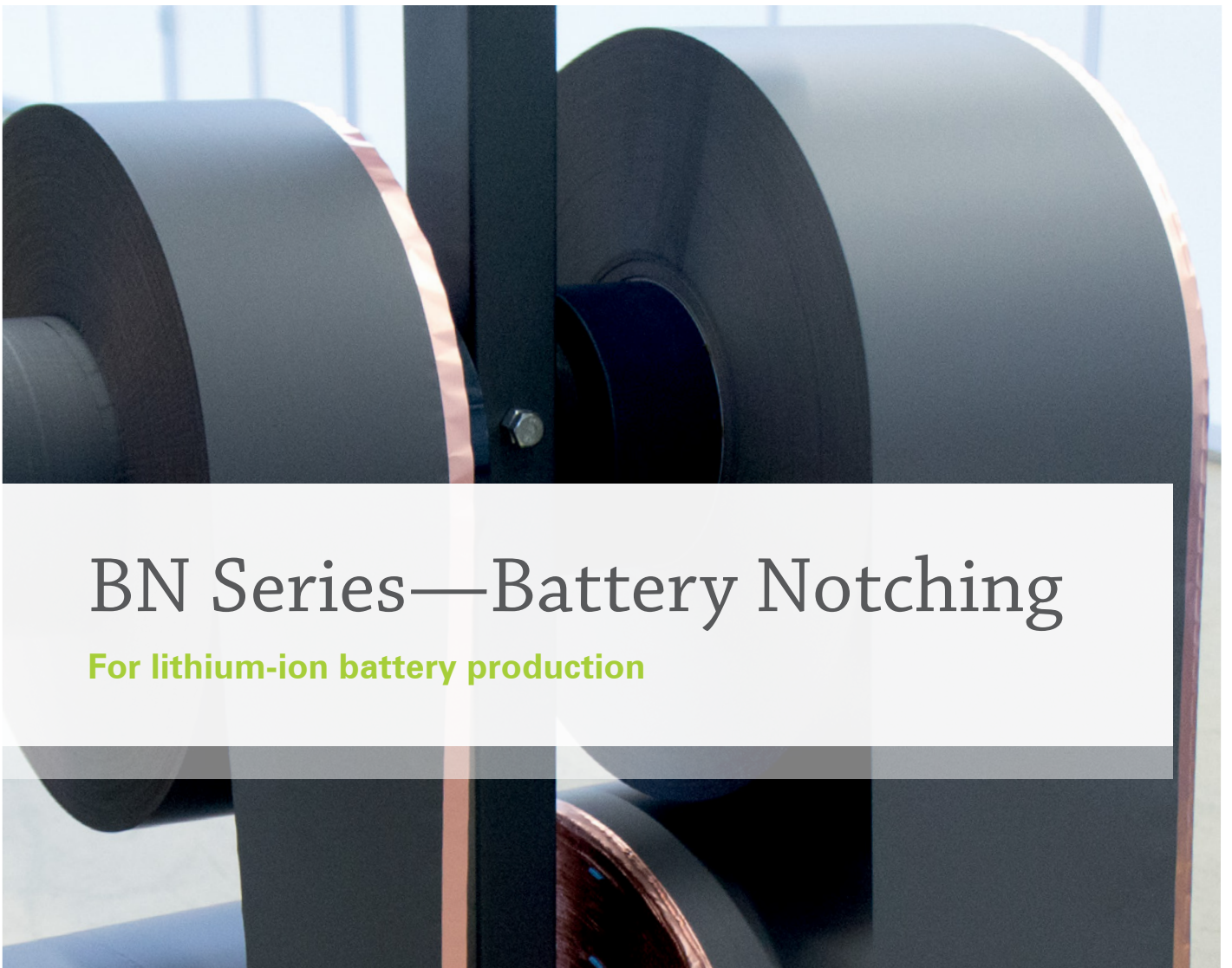
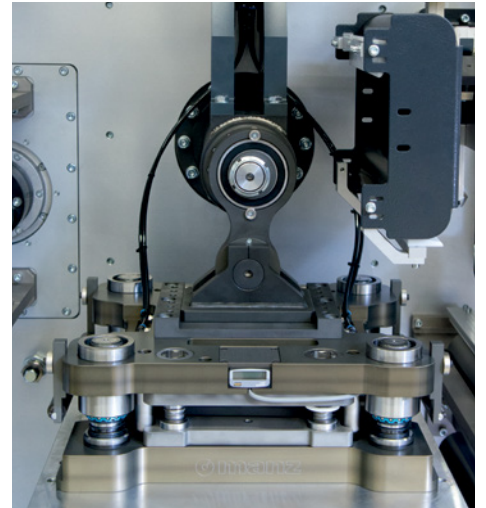




BN SERIES—BATTERY NOTCHING



BN Series—Battery Notching

For lithium-ion battery production



GERMAN ENGINEERING – INTERNATIONALLY STAGED – GLOBAL REFERENCES

30
Years of experience

1,700
Employees

24/7
There for you

Manz AG

Established 1987
Headquarters in Reutlingen, Germany.
Additional branches in Slovakia, Hungary,
Italy, China, Taiwan, the United States,
and India.

Employees

approx. 1,700 employees worldwide,
including around 500 engineers

Core technologies

Automation
Metrology
Laser processing
Wet chemistry
Roll-to-roll

Production solutions for lithium-ion batteries

AS A HIGH-TECH EQUIPMENT MANUFACTURER, MANZ DEVELOPS AND PRODUCES HIGHLY EFFICIENT PRODUCTION SYSTEMS FOR THE PRODUCTION OF LITHIUM-ION BATTERY CELLS, MODULES AND PACKS.

Manz AG is one of the leading suppliers of **production equipment for lithium-ion battery cells, modules and packs, as well as for capacitors.** We have been setting global standards in this field for 30 years.

Manz offers individual machines as well as integrated production lines as standard or customer-specific solutions:

- for various cell shapes, such as **cylindrical cells, hard-case cells and pouch cells**
- for **wound cells or stacked cells**
- for batteries for various applications such as **portable devices, cell phones, BEV** (battery-electric vehicles), **PHEV** (plug-in hybrid electric vehicles) or **HEV** (hybrid electric fuel vehicles) and **stationary storage systems**

Our machines are known for high production speed and a wide range of battery sizes to be produced.

Precision, reliability, durability, availability and low overall operating costs (TCO) are the main features of our high-tech production systems. The individual system or production line can be adapted uniquely upon request using our modular machine design.

Our performance spectrum spans from battery cell production (**cell assembly**) to the assembly of individual battery cells in a battery system (**pack assembly**).

We accompany you from the initial idea to the final production process and are at your side during planning, projecting, construction and installation of your production line.

In addition, we support you with our comprehensive know-how through the setup and commissioning of the system, with user training, remote maintenance and after-sales service.



Notching Process Milestones

1995

Due to increasing customer requirements for throughput and efficiency in battery production, in 1995 Manz Italy (previously Arcotronics) developed the notching process. The process established itself as a standard in the following years and now is used worldwide by all battery manufacturers.

2005

Through the systematic further development and implementation of new technologies, by 2005 Manz Italy had doubled its throughput and web speed. To continue to meet the ever growing requirements for quality, the systems were expanded by integrated measurement technology systems.

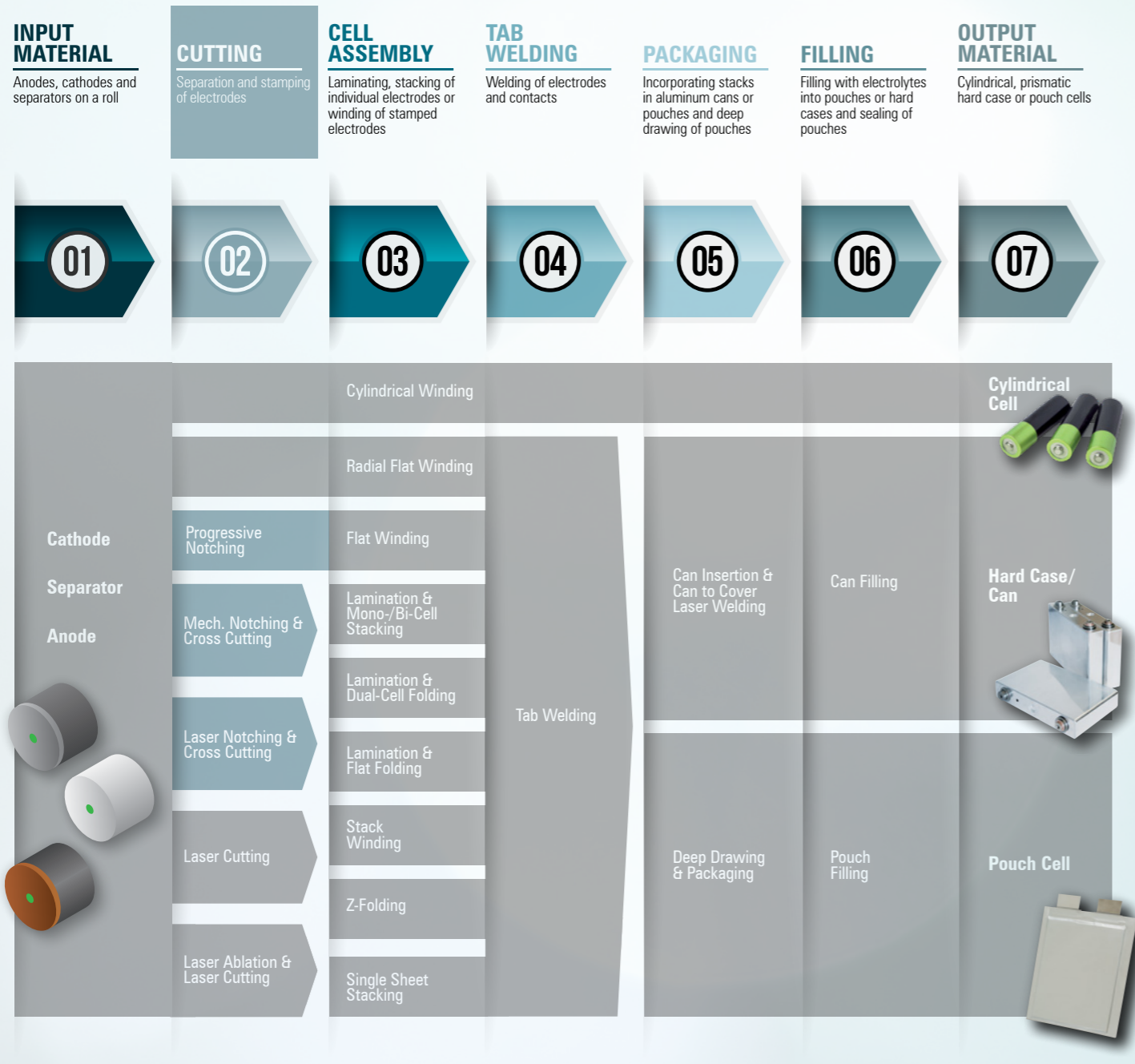
since 2016

In order to manufacture a wide variety of production configurations efficiently, Manz developed the modular *BN Series* for battery notching. The company is able to flexibly and quickly meet customer demands through the combination of different modules.



LI-ION BATTERY PRODUCTION – MANZ TECHNOLOGY MATRIX

MANZ PROVIDES EQUIPMENT FOR ALL PRODUCTION STEPS RELATING TO THE MANUFACTURE OF LITHIUM-ION BATTERIES. WITH THE *BN SERIES* ALL MECHANICAL OR LASER-BASED NOTCHING PROCESSES ARE COVERED.



Highspeed Notching of Lithium Ion Battery Cells

WITH THE *BN SERIES* MANZ OFFERS A HIGHLY EFFICIENT SOLUTION FOR THE MANUFACTURE OF INDIVIDUAL ELECTRODES OR ELECTRODE WEBS.

The *BN Series* is suitable for a variety of different notching processes. From **Constant Pitch to Progressive Pitch up to Double Progressive Pitch, using mechanical cut or laser cutting** – all notching processes and process variants can be implemented using the *BN Series*.

Therefore, the *BN Series* is the best choice for the production of high-quality **hard-case batteries** or **pouch cells**, with the **best price-performance ratio** of available notching systems.

Productivity, speed and throughput
With the *BN Series*, throughput and productivity are increased and at the same time production costs are lowered. The system has the highest material speed on the market and also offers one of the most efficient processes with simultaneous high yield.

High degree of material utilization
Material recognized as defective is detected right after the notching process, then marked or immediately sorted out. Thus, the scrap in the subsequent processes is held to a significantly low level and the manufacturing costs are substantially reduced.

The integrated measurement systems ensure that constant precision and 100 % checked output material are guaranteed.

Quality and safety of the end products
Integrated and optimally matched measurement methods for inline quality inspection ensure that the electrode material is constantly cut with high precision. The high accuracy of tab pitch and angle ensures high-quality and safe battery cells.

In combination with high-quality machine components, the integrated measurement technology guarantees a maximum of product quality. Vacuum transport rollers and almost totally smooth accelerations ensure continuous material speeds and thus a very gentle and low-stress process flow. Therefore, negative influences, such as delamination of the coating or wrinkles in the web, are minimized. Thus, a consistently high quality and safety in the battery cells is guaranteed.

BN Series—Battery Notching

Applications

Roll-to-Roll / Roll-to-Magazine / Roll-to-Cell

Processes

Constant Pitch

Pouch, Hard Case, Consumer Cells



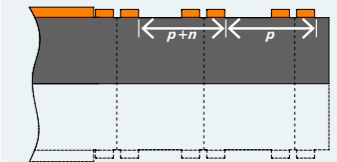
Progressive Pitch

Hard Case, Consumer Cells



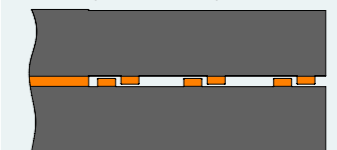
Double Progressive Pitch

Hard Case



Central Barefoil Constant Pitch

Pouch, Hard Case, Consumer Cells



 **BN SERIES—BATTERY NOTCHING**

Auto-splice unit

Automatic roll change for continuous operation of the equipment.



Web guiding system/EPC

Regulates the position of the web through direct recognition of the web or coating edge.



Notching unit

Highly dynamic drive unit for all types of punching tools.



Vision system (CCD)

Enables constant high CpK values for the dimensioning or the pitch of the electrode.



Auto-splice unit

Automatic roll change for continuous operation of the equipment.



Unwinding units

Highly precise, 3-point mounted, centrally clamped mandrel in 3" or 6" design. Continuous diameter detection for user warning and triggering the splicing.



Web guide rollers

Minimize load and stress on the material web during standstill/cut. Prevent delamination and particle generation. Minimize material fracture.



Vacuum pulling unit

Minimize mechanical load and material stress. Prevent delamination of the coating and particle generation.



Cleaning system




Efficient cleaning off of possible existing particles for better service life and higher quality of the batteries. Reduces scrap from short circuits (Hi-pot failure).



Winding mandrels/ magazines/winding

The appropriate modules are built depending on the application and method.



-  Increases profitability
-  Increases productivity
-  Increases the quality and safety of the battery cells

Our Locations



Manz AG
Steigaeckerstrasse 5
72768 Reutlingen
Germany

Tel.: +49 7121 9000 0
Fax: +49 7121 9000 99

www.manz.com
info@manz.com