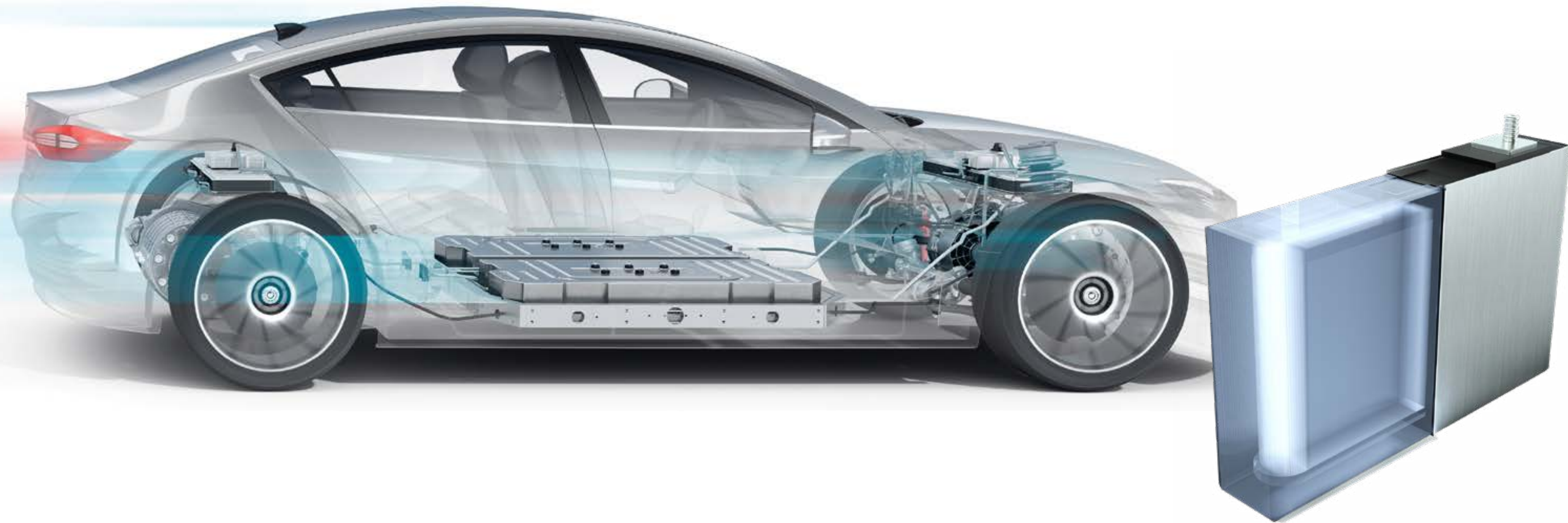


ZEISS eMobility Solutions

# Industrial Computed Tomography for Battery Cell Inspection



Seeing beyond



## **New Quality Requirements** Non-destructive CT inspection for speed and precision

The rapid global shift to new energy vehicles (NEV) poses a variety of quality assurance challenges, with metrology also greatly impacted by increasing demands relating to accuracy. As an international innovation leader, ZEISS eMobility Solutions provides advanced technologies to ensure the reliability, efficiency, and safety of NEVs.

Electric powertrains feature high-performance battery cells. These cells are characterized by detailed and evolving production processes. Particular attention must be paid to consistency, structural strength, and the elimination of hazards such as overhang beyond tolerance and debris contamination.

The dense battery cells and complex inspections exceed the capabilities of 2D X-ray technology. Operators must therefore deploy non-destructive industrial computed tomography (CT) to perform quality assurance with the necessary speed and precision. These QA processes include both component validation and root cause analysis for further upgrades.



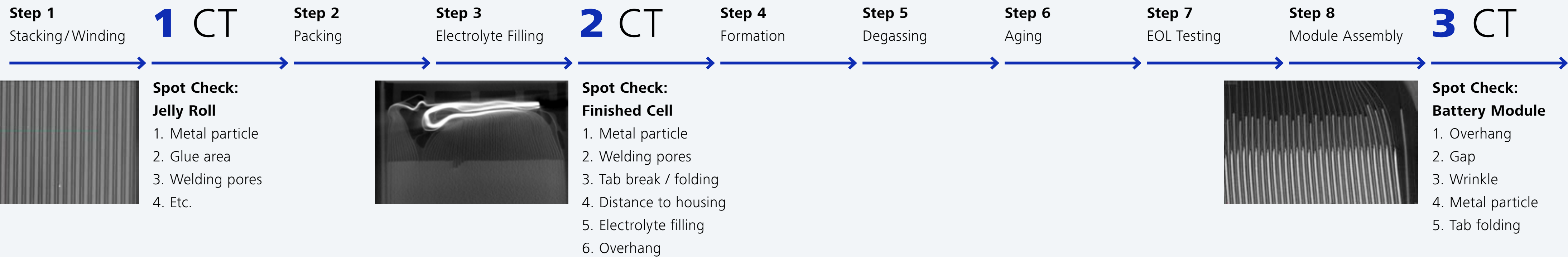
# Ensuring Quality Production

## Problem identification with CT

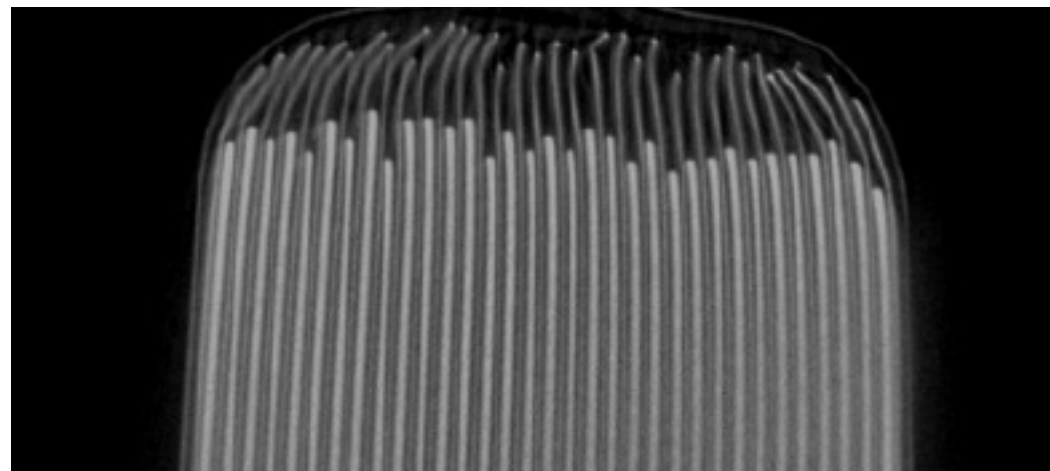
Every step in the battery cell production process can trigger major quality issues further downstream. Non-destructive inspection is therefore required at several intervals in order to pinpoint problems as early as possible. CT spot checks ensure reliable identification of typical issues ranging from overhang to metal particle contamination. If not detected, each of these can significantly impair the production quality of battery cells.



### Production process of battery cell

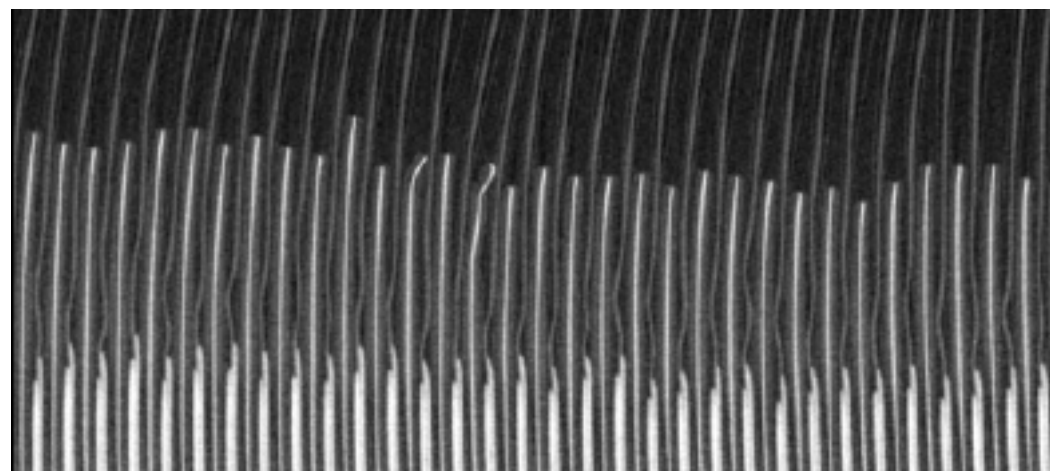


## Application Areas of Industrial CT



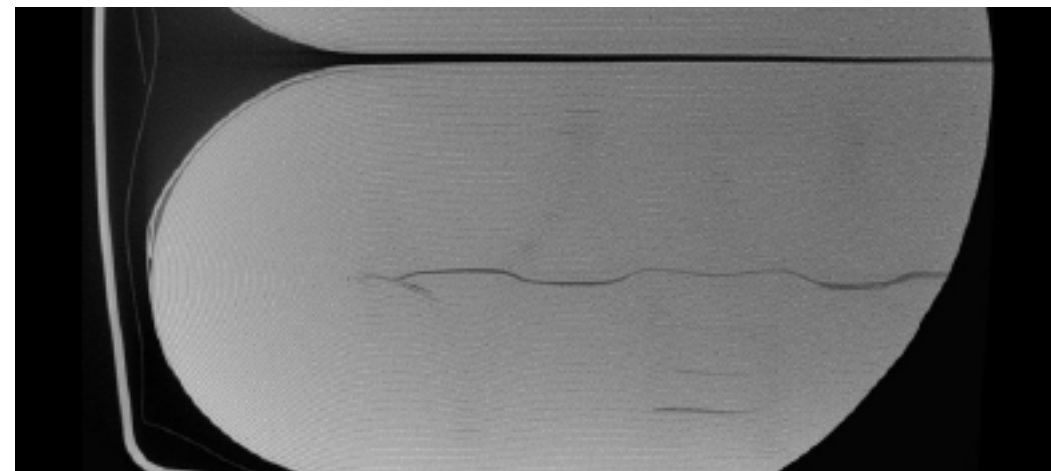
### Atline Production

- 2D X-ray: insufficient clarity for thicker rolls and ambiguity when measuring overhang
- CT performs spot checks to ensure proper formation of jelly roll cells and pouch cells



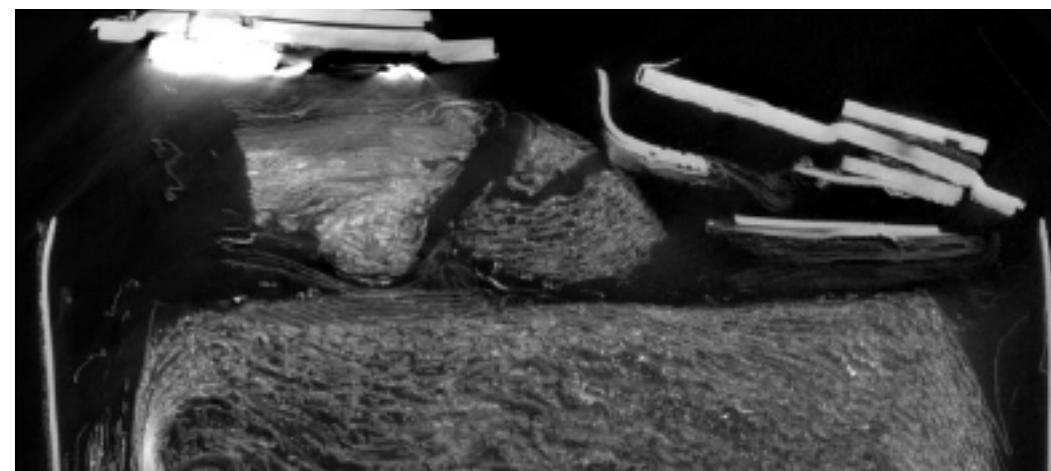
### Research and Development

- High-resolution, high-magnification CT for small test pieces such as button cells
- Quantifies assembly quality to ensure precision machining within tight tolerances



### Quality Lab

- CT inspection is a one-stop solution for comprehensive understanding of entire cell
- Statistical data and quantification of results for determining manufacturing standards



### Failure Analysis

- CT boosts safety by delivering clear failure overview and identifying root cause
- Scans for causes of varying severity, including overhang, wrinkles, and overcharging

## Added value with this ZEISS solution



### Productivity

- Simultaneous scanning of multiple parts
- Automatic cell separation
- Powerful X-ray tube for shorter scan time



### Continuous output

- Ventilation system, long-lasting filament
- 48-hour response time with ZEISS Service



### Better results

- Improved internal radiation scatter shielding
- Higher magnification aids R&D analysis



### Reliability

- High accuracy: MPESD =  $4.5 + L/50 \mu\text{m}$
- Seamless volume merge
- Geometrical and rotation axis calibration



### Cost savings

- Single machine for all NEV cell types
- Long service life and high durability
- Identify defects before post-processing



### Data visualization

- Quality task and data management solution
- ZEISS Volume Inspect software: individual functionalities and automated processes

# Reliable Advanced CT System

## ZEISS METROTOM 1500

<b>X-ray tube</b>	225 kV / 500 W
<b>Source-to-detector</b>	1500 mm
<b>Detector size</b>	427 mm x 427 mm
<b>Detector resolution</b>	3072 px x 3072 px
<b>Pixel size</b>	139 $\mu$ m
<b>Measuring volume</b> (diameter x height)	615 mm x 800 mm

### Benefits:



- 3k detector for high-resolution capture
- 6.7 m<sup>2</sup> footprint for flexible installation
- 870 mm part height and 50 kg weight
- Fulfils VDI/VDE 2630 sheet 1.3



## Global Metrology Network

Our global service network provides easy access to ZEISS expertise around the world. We use local teams to ensure a swift response and reduced downtime. Make your operations even more secure and reliable with ZEISS.

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