



## **New generation of cell contacting systems: Opportunities and challenges for the automotive industry**

- **A market study commissioned by Manz by the "Production Engineering of E-Mobility Components (PEM)" chair at RWTH Aachen University shows trends and market potential for cell contacting systems (CCS) in the coming years**
- **Technical changes have a significant impact on CCS production**
- **With automated production solutions from Manz, automobile manufacturers and suppliers are well prepared for challenges**

**Reutlingen, May 15, 2023.** Battery production for e-cars is picking up speed in Europe - and with it the need for cell contacting systems (CCS). With its production equipment, Manz AG has been supporting well-known automobile manufacturers and suppliers in the fully automated production of components for the electric drive train for years. Therefore, the process know-how and the production expertise of the machine builder are also correspondingly high in the production of CCS. The market is currently very dynamic and the requirements for CCS manufacturers will change fundamentally. In an exclusive market study commissioned by Manz, the "Production Engineering of E-Mobility Components (PEM)" chair at the RWTH Aachen University examined the key developments at CCS. The following trends can be derived from this:

### **Trend 1: New, modified battery system architecture**

In the past, the structure of a battery system in the three levels of battery cell, battery module and battery pack was common, but this architecture is increasingly being replaced by the omission of clear boundaries. The trend is towards so-called Cell-to-X (CTX) battery systems.

1. **Cell-to-Pack (CtP):** The CtP concept offers some advantages, such as higher energy density, easier manufacturing, better heat dissipation and higher rigidity compared to other concepts.



2. **Cell-to-Chassis (CtC):** The battery cells are built directly into the underbody of the vehicle and the battery pack is fused with the chassis. This not only reduces weight, but also achieves better heat dissipation and higher rigidity compared to CtP, which contributes to higher safety and better vehicle control.
3. **Module-to-Chassis (MtC):** Here fully assembled battery modules are built into the underbody of the vehicle. The MtC concept offers a number of advantages, such as greater design flexibility and easier maintenance, as defective modules can be more easily replaced.

### **Trend 2: Higher energy content in battery cells**

In the case of cylindrical, prismatic battery cells and pouch cells, there will be changes that will affect the CCS architecture.

- Cylindrical battery cells: increase in the standard diameter from the previous 21 mm to 46 mm and, as a result, a fivefold increase in volume and energy content.
- Prismatic battery cells: doubling of the average energy content from the current 100 Ah to over 200 Ah.
- Pouch cells: Also significant increase in energy content - but the increase is more difficult to quantify.

The consequence for CCS: The assemblies are becoming larger and have a higher degree of integration in order to cause as few work steps and thus costs in module assembly as possible. The future CCS will grow from currently less than 50 cm at the longest edge to sometimes up to 200 cm!



### **Trend 3: Completely pre-assembled CCS**

In the future, automobile manufacturers will expect the highest possible degree of CCS pre-assembly from suppliers in order to keep the downstream costs in battery module and system production as low as possible. On average, seven CCS with up to 30 individual parts have to be manufactured per vehicle. The machine and plant builders must provide appropriate plant concepts in order to manufacture the large number of individual components cheaply and reliably with a high degree of pre-assembly.

### **Trend 4: Short supply chains through local production**

When looking at the production structure, it is already apparent today that the vehicle manufacturers want the shortest possible transport routes for the battery cells, modules and systems are aimed at. In the future, most automobile manufacturers will rely on local production and local installation of these battery cells by keeping the distances between the supplying battery cell production, the associated battery module and pack production and the supplied vehicle plant short. Due to the high degree of automation in CCS production, personnel costs play a subordinate role in the location decision. For CCS production, location factors such as favorable supply chain and production conditions, the availability of skilled workers and an intact service network in mechanical and plant engineering come to the fore.

### **Trend 5: Low degree of standardization**

In the coming years, the CCS will remain a product with a low degree of standardization and great potential for differentiation between the individual vehicle manufacturers and battery cell formats. As a result, there will be no concentration on a few CCS manufacturers in the market, but rather a diversification of the CCS manufacturers with specialization on the different requirements with regard to battery cell format and system design. In competition, it is therefore crucial to provide a product and production concept for a specific system design as early as possible that meets the automotive manufacturer's requirements in terms of costs and quality. At the same time, a certain degree of flexibility is required to respond to design changes as needed. Mechanical and plant engineering plays a key role in the implementation of such production concepts.



### **Trend 6: Transition to 800V battery systems**

In battery systems, the trend is towards higher voltages in the range of 800V and more. Starting with premium vehicles, the 800V battery systems will also gradually establish themselves in vehicles for the mass market. Accordingly, the market share of 800V battery systems in new registrations will exceed the 50 percent mark in the second half of the 2020s. However, the increasing flow of current due to the higher voltage places greater demands on the material, geometry, connection and thermal design of the electrical connectors (busbars). Above all, the requirements with regard to increased creepage distances are problematic when designing CCS. Due to the higher voltage, arcing is possible over significantly longer distances. CCS manufacturers can differentiate and contribute here through intelligent production concepts, such as better insulation or greater distances between live components.

You can download the entire study free of charge from the following link:

<https://www.manz.com/en/market-study-rwth-aachen-developments-trends-in-cell-contacting-systems/>

### **Unternehmensprofil:**

#### **Manz AG – engineering tomorrow's production**

With a focus on the automotive industry and electromobility, battery production, electronics, energy, and medical technology, Manz develops and builds innovative and efficient production solutions: From customized single machines for laboratory production or pilot and small series production, to standardized modules and systems, to turnkey lines for mass production.

Technologically, Manz's production equipment is based on many years of experience in automation, laser processing, wet chemistry, inspection systems, and digital printing.

Manz AG bundles its activities into two reporting segments: Mobility & Battery Solutions and Industry Solutions. The focus in the Mobility & Battery Solutions segment is on intelligent production solutions for highly efficient lithium-ion batteries. The Industry Solutions reporting



segment is responsible for assembly and production solutions for electronic components and devices, power and consumer electronics, and components for the electric powertrain.

With currently around 1,500 employees, the Manz Group develops and produces in Germany, Slovakia, Hungary, Italy, Mainland China and Taiwan. Sales and service subsidiaries also exist in the USA and India.

Manz AG was founded in 1987 and has been listed on the Frankfurt Stock Exchange since 2006. In fiscal year 2022, the Group generated revenues of around 250 million euros.

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