The DigiBattPro 4.0 project – BMBF

Marker-free position measurement of sheeting

In the production of sheeting such as flat steel, steel strapping or metal foils, sometimes an entire coil – which means several tons of steel – has to be discarded because of a single defect. The risk of a defective section being integrated into a final product is too great. From a financial and ecological perspective, it would make more sense to discard only the defective section of a coil. This would require measurement and process data to be matched to the exact position on the coil, which has not been achieved yet. In some cases, continuous laser engravings or colored markings have been used, but depending on the product, this can compromise the surface or interfere with downstream processing. Determining the position with a rotary encoder is not accurate enough. Furthermore, the position cannot be determined anymore once the coil has been cut into sections. The solution would be an absolute position measurement on the coil, which would have the added advantage of allowing sections to be traced further down the line.

Fraunhofer IPM and Fraunhofer IPA jointly investigated whether the Track & Trace Fingerprint method for marker-free component identification could be used for high-precision position measurement using electrode foil as an example. After being plated, the 30 µm thin copper/aluminum foils are cut into electrodes. Before they are cut into sections, cameras capture the tab area, which is only a few square millimeters wide, on the edge of an electrode strip. In this case, two times four cameras were installed above the conveyor belt of a pilot system, which – assigned to four electrode strips – captured and later identified the fingerprint area at a feed rate of 25 m per minute. The team was able to successfully identify electrode sections based on the surface microstructure without any ambiguity, matching the process data of a position on an electrode foil with an accuracy of 100 micrometers. The team is working on adapting the method to other applications in metal blank processing and for other materials, such as paper. This should lay the groundwork for creating digital twins in the production and processing of sheeting.

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Reliable tracing of sections: In the production of sheeting, process data can be linked to a specific section of a coil with Track & Trace Fingerprint technology.

> We will be able to link the process data with a specific position on a coil."
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> *Dr. Tobias Schmid-Schirling, Group Manager*