



ELECTRONICS AND MICROSYSTEMS

TAPE CASTING COMPETENCE CENTER IN HERMSDORF

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The technique of tape casting and coating is a highly productive method for producing large, flexible tapes of functional materials very efficiently and cost-effectively in roll-to-roll processes. Fraunhofer IKTS has been a leader in research and development in this area for decades.

The Tape Casting Competence Center at Fraunhofer IKTS in Hermsdorf has five tape casting machines for realizing different layer formation processes and drying methods. Three casting machines operate according to the classic doctor blade method and differ in terms of drying channel length, casting speed, and drying principle (convection, contact, UV, or IR). With the battery and the triple slot die coaters, the casting portfolio has been extended to include slot die casting.

The battery coater developed within the "VALIBAT" project according to Fraunhofer IKTS specifications implements an innovative, modular, and ecological casting concept and is used for performing coating tasks in the area of Li-ion battery research. After the layer has been applied by means of a slot die, the cast electrode is dried in a non-contact manner through levitation and can then be compacted in a calender integrated in the system. The solvents contained in the slurry are disposed of after the drying process by means of thermal postcombustion, with the energy generated during the combustion being returned to the machine for drying the layers.

The triple slot die coater enables multiple layers to be produced in one process step using the triple slot die. This makes it possible to cast different functional tapes or functionally graded tapes directly in a "wet in wet" process.

In addition to coating on carrier tapes, direct casting onto a steel strip is possible. Both systems can easily be converted to the classic doctor blade process.

The Tape Casting Competence Center processes both aqueous and organic tape casting slurry systems. Established organic materials, such as polyvinyl butyral, as well as innovative systems are used in the tapes. The solids contained in the tapes can have densities up to 19 g/cm^3 in extreme cases and have an average grain size of $d_{50} = 200 \text{ nm}$ to $d_{50} = 30 \text{ }\mu\text{m}$. Tape casting slurries with viscosities in the range of 100–30,000 mPas can be processed on the casting machines.

Applications for the tapes from the new center range from classic ceramic microsystem technologies (LTCC and HTCC) and the current strategic field of battery research to filtration, gas separation, and a variety of special tapes.

1 Triple slot die coater.

2 ValiBat coater.