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**Food Processing and  
Packaging Machinery**

## **Prof. Dr. Jens-Peter Majschak on alternative plastic packaging materials on high-speed packaging ma- chines**

Prof. Dr. Jens-Peter Majschak is head of the Fraunhofer Institute for Process Engineering and Packaging IVV in Dresden. He talks to us about the challenges of alternative plastic packaging materials in high-speed packaging machines.

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## **What are the technical challenges of substituting traditional plastic packaging materials for recyclable plastic packaging materials in high-speed packaging machines (FFS)?**

It is not possible to identify a general improvement or deterioration of the various processing parameters. Even with regard to individual parameters such as coefficient of friction or stiffness, generalised predictions or predictions are not possible, as individual investigations show. However, the following statements can be made from previous investigations and as a conclusion of various discussions:

When developing such packaging materials, the machinability must be taken into account.

Nevertheless, the following applies: "Wide processing windows" and thus a packaging material-neutral functioning of the packaging process within generously tolerated setting parameters can probably no longer be assumed to the usual extent. This makes it more difficult to adjust the machines and start-up processes after a packaging material change. In order not to let this result in too serious availability disadvantages, these things are becoming increasingly important:

- Methods and tools for the determination of processing parameters in the course of a better characterization of packaging materials
- related standards,
- Availability of these parameters at the machine,
- more robust or finer parameterizable sub-processes and components,
- self-optimizing systems and operator assistance

## **What are the technical challenges involved in the substitution of traditional plastics for natural fibre-based packaging materials in high-speed packaging machines (FFS)?**

The stiffness in connection with the thickness of these packaging materials changes the requirements on form and sealing equipment. The focus is on topics such as forming behaviour on form/fill/seal machines, integration and mastery of 3D forming of cups, trays and similar packaging materials with acceptable quality, integrity of barrier layers after such processes and tight sealing in the area of layer jumps on bags. The latter is made more difficult by the sensible endeavour to reduce the thickness of sealing layers in order to get below the 5 percent limit of the proportion of such layers in the composite and thus be able to classify the packaging material as a mono-material. Attention should also be paid to the potential for contamination through abrasion and cutting dust. Fillers can also increase the wear and tear on separators. Depending on the packaging material, the instability of the processing parameters is generally increased by the influence of moisture.

**adaptive machines scenario: How can a growing variety of packaging materials with fluctuating processing properties be processed without additional sensors and additional adjustment work on the machines? What does the machine need to know about the packaging material in order to adjust to it? What processing properties can be determined on the machines without additional sensors? Which assemblies enable the adaptive (adapted to material properties) processing of packaging materials (forming, joining)?**

Following on from the answer to the first question, methods, tools and standards for the determination of packaging material properties relevant to processing are becoming even more important. There is clearly still considerable research potential here. Once specifications have been determined on this basis, they can be communicated to the machine in various ways: By data transfer from the supplier (via various available channels) or from the packaging materials laboratory. Additional sensor technology on the machine must and

should not be generally excluded, because the "species spectrum" is growing, ever greater potential of optical processes is becoming visible and prices are tending to fall.

Disadvantages, which are probably decreasing more and more, are an additional risk of failure (due to lower prices and thus the possibility of redundancy), integration difficulties (due to miniaturisation) and critically large data streams (due to "intelligent" sensors with their own data processing - edge computing). This makes it all the more important to know which data is relevant. An interesting competition between analytical and statistical modelling methods is already underway ("machine learning"). The latter also promise to be able to find complex correlations that exist between already existing data (existing sensors and drives), but which are difficult for humans to find and correctly assign to events. In the course of increasing networking, data from the history of packaging materials (production, pre-processing, transport and storage) could also be included in the future. For the foreseeable future, however, the monitoring or assessment of the results of such automated evaluations by human experts seems to be necessary in the majority of cases for a number of objective reasons or to make sense for reasons of efficiency.

**For further information please visit the website of the [Fraunhofer Institute for Process Engineering and Packaging IVV in Dresden](#).**

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by VDMA Food Processing and Packaging Machinery

The interview was conducted by Dr. Peter Golz, VDMA Food Processing and Packaging Machinery

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