Assessment of the inflatable core assisted paper bottle moulding process

Eco-friendly products have gained importance in recent years. The paper bottle is a sustainable packaging solution for carbonated beverages. The moulding process is a two-stage process. At first, pulp is poured in the forming mould and fibers are formed in the desired shape. Wet bottle is then transferred to the drying mould to remove bound water. The drying process makes use of an inflatable core, which not only prevents the shrinkage of fibers but also helps in attaining good fiber compaction. Preliminary investigations reported uneven fiber compaction in changing curvatures and sharp corners. A cause of uneven thickness distribution in the geometry is uneven compaction pressure during core expansion.

A FEM approach is developed to predict the occurrence of non-conformities in the bottle. Hyperelastic core material is modelled using Mooney-Rivlin material model from the elastic strain density function. The model can be used to optimize the core shape, thus developing a robust tooling solution.

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