SFB 1120

Annual report 2018

Subproject T1

Title

Injection compression moulding of thick-walled plastic optics with demand-oriented mould temperature control taking into account the local cooling requirements

Project anagement /-processing

Univ.-Prof. Dr.-Ing. Hopmann, Christian (Management)
Gerads, Jonas M.Sc. RWTH (Processing management)
Chair for plastics processing RWTH Aachen University
Seffenter Weg 201
52074 Aachen

Task definition

The aim of transfer project T1 is to implement the findings of basic research from B1 by means of an application-oriented demonstrator and to investigate basic process principles and process approaches for thick-walled optical components.
In project year 2018, the algorithm was adapted and further developed for thick-walled molded parts with wall thickness jumps. Furthermore, a typical thick-walled plastic lens was defined as a demonstrator in cooperation with the industrial consortium.

Procedure

Based on the results of subproject B1 from the first funding period, the focus is on the question of the adaptability of the algorithm for thick-walled plastic optics. As a starting point, the developed quality function for thin-walled plastic molded parts was applied to thick-walled molded parts and the temperature control was analyzed by means of an injection molding simulation. Currently, the quality function is transferred to molded parts with different wall thicknesses and wall thickness jumps.
The demonstrator was selected in coordination with the industrial partners in such a way that the optical and geometric quality can be compared with the properties of current series parts.

Results

For the algorithm developed in subproject B1, the material model for amorphous plastics could be adapted. For simple geometric shapes the simulation methodology was tested. For a simple lens geometry the local cooling requirement was calculated and a first cooling channel design was derived. This was simulated in thermal calculations and is currently being analysed. Furthermore, this methodology was performed for different wall thicknesses.
As a demonstrator a thick-walled secondary optics for automotive applications with wall thickness jumps was chosen. This allows an evaluation and classification of the molding accuracy and optical properties at a later stage of the project.

Summary and Conclusion

In the course of the project year 2018, first adaptations of the simulation methodology for amorphous thick-walled plastic molded parts could be carried out and a suitable demonstrator geometry could be defined.
The design methodology was applied to different wall thicknesses. In the coming project year, the methodology is to be extended so that the compression moulding process can be mapped and the calculation of the local cooling requirement of thick-walled moulded parts in the injection compression moulding process is possible. This requires the consideration of a variable wall thickness during the stamping process.
At the same time, the design implementation of the demonstrator geometry in an injection mould with compression moulding technology available at the IKV is being investigated and worked out.

Publication

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