

## Recent Progress in Micro Injection Moulding

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### Technological Benefits for Users

- Injection moulding offers decisive advantages for nano- and micro-manufacturing:
  - a wide range of processible polymers, metals, and ceramics
  - very high economic efficiency in medium/large-scale fabrication
  - complex shaped 3D parts (singular items or nanostructured bodies)
  - a large diversity provided by sophisticated sub-variants

### Proposals

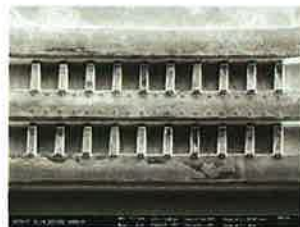
#### Development of Liver-on-Chip platform

production of mould insert  
(in cooperation with IMT and IAM-AWP)

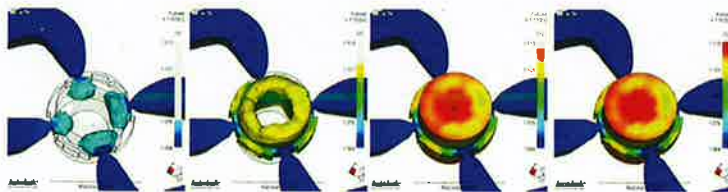
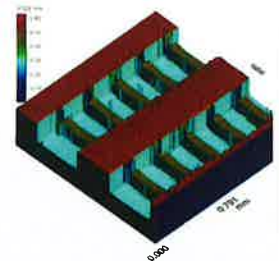
main challenge: replication of 20-40µm gates between parallel channels  
injection moulding of > 50 pieces using polycarbonate (PC)

Results:

User: **Universidad Politecnica de Madrid**



Figures of the mould insert used for the injection moulding trials. REM-image (left), FRT 3D scan (right)



Simulation of mould filling by four gates using a 17-4PH stainless steel feedstock

#### Powder injection compression moulding of high-precise membrane carriers

technology transfer project funded by DFG

development of special tool enabling additional compression step

development of process conduct to achieve minimum membrane thicknesses

investigation of part accuracy with/without embossing step

Results:

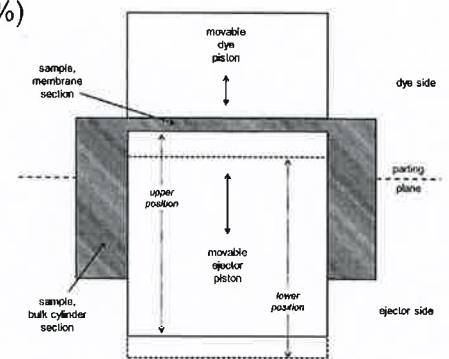
minimum membrane thicknesses ca. 140µm (before project 400µm)

best replication accuracy  $\pm 0.15 - \pm 0.4\%$  (before project  $\pm 0.5\%$ )

User: **Robert Bosch GmbH**



Top view on sintered stainless steel membrane (left), operation scheme of the new tool comprising embossing step (right)



### Outlook

- Increased processing of smart materials
- Hybridization of processing technologies, i.e. combinations of different replicative or additive methods
- Offer the whole range from prototyping up to very large-scale production using polymers, metals, and ceramics