Some aspects regarding the use of a pneumomechanical high speed forming process

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Comparison of pneumomechanical and electrohydraulical process

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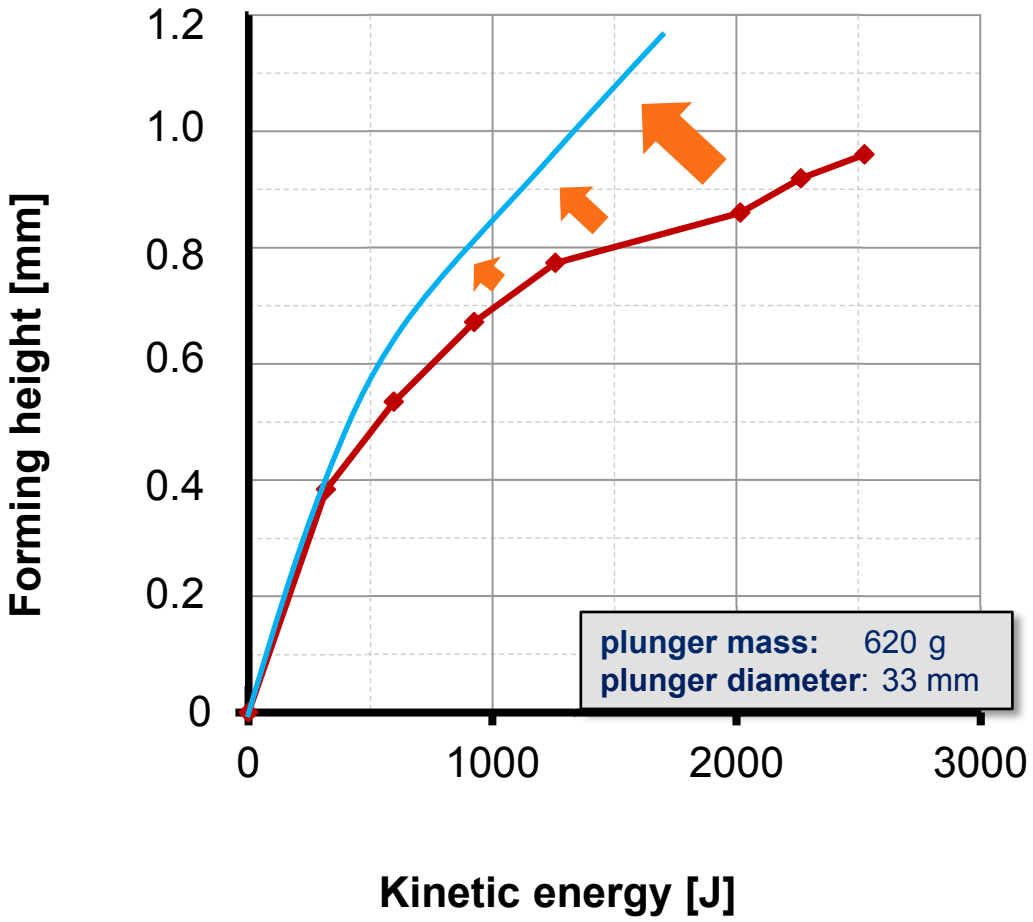
Influence of important process parameters:

- Pressure
- Pressure distribution
- Kinetic energy
- Charging energy

Aims:

- Effectivity
- Complexer parts



Pneumomechanical setup

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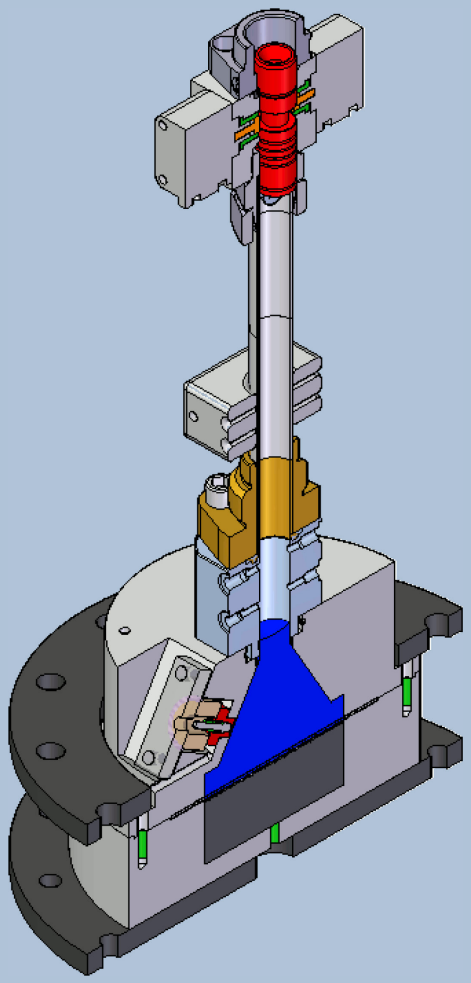
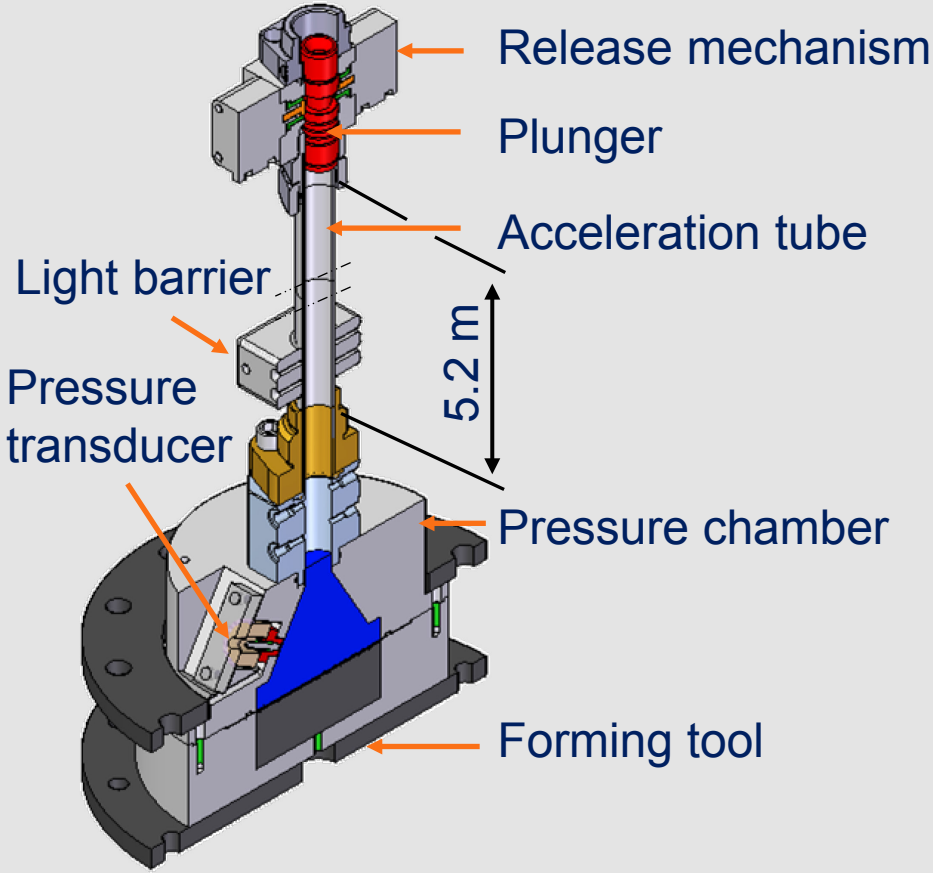


Working principle



Pneumomechanical setup

Electrohydraulical setup

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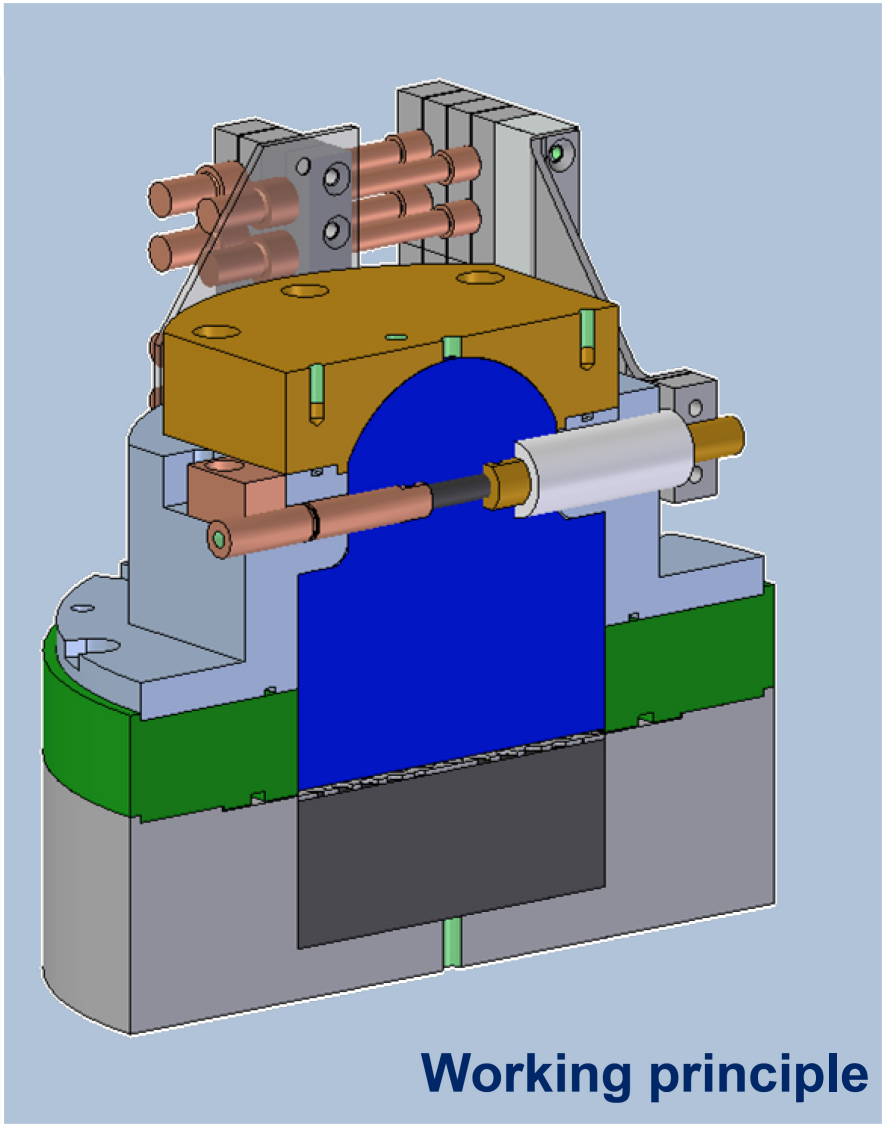
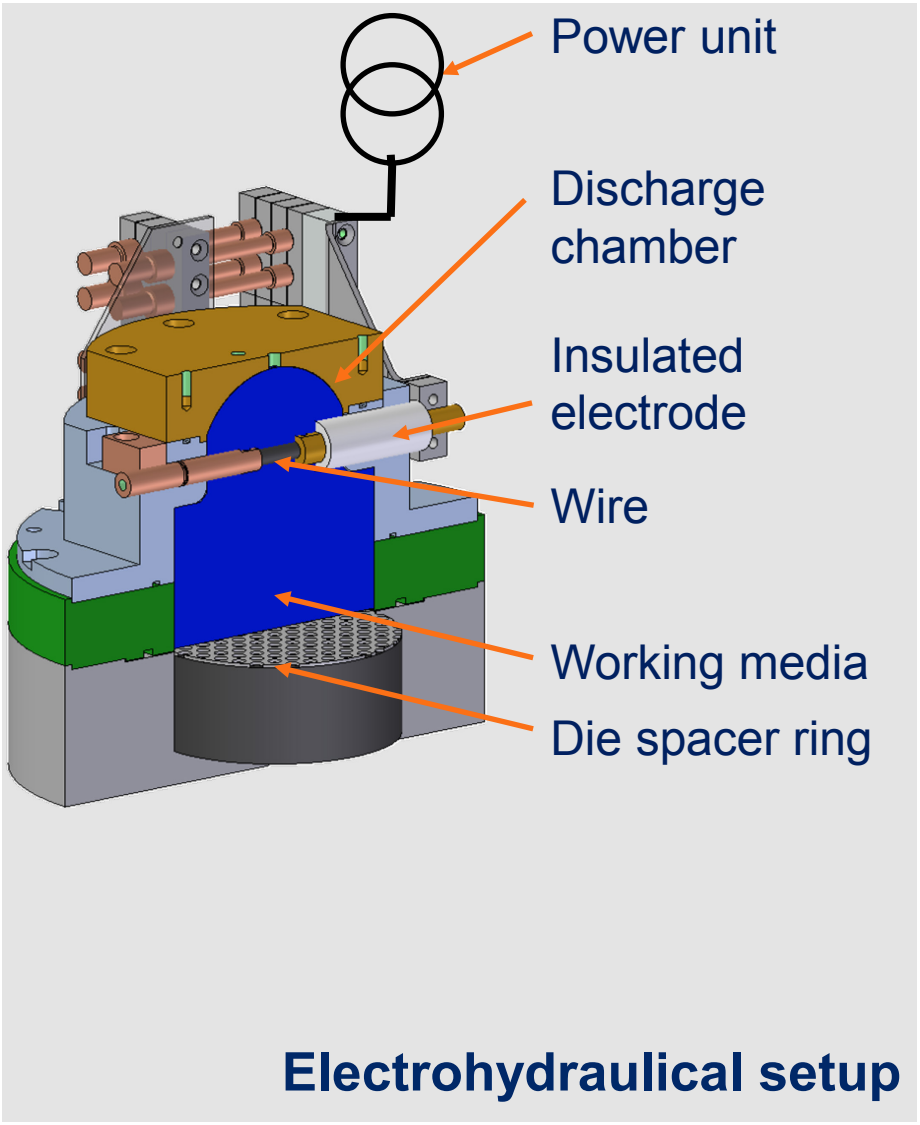


Working principle



Electrohydraulical setup

Qualitative determination of the pressure distribution

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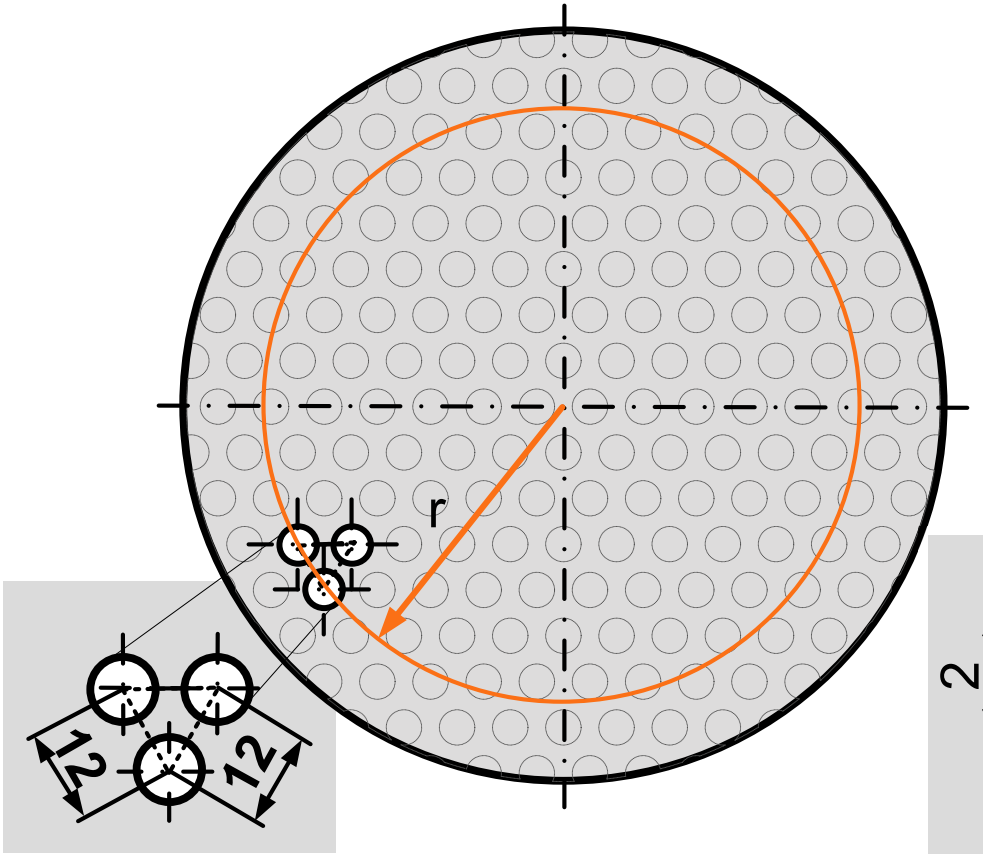
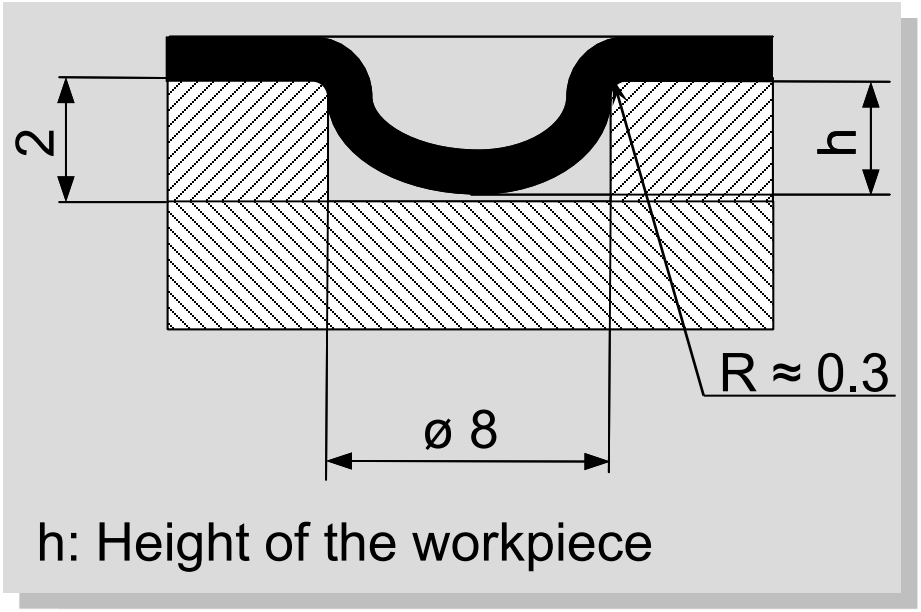


- Blank-diameter: d_0 = 220 mm
- Blank-thickness: s_0 = 0.5 mm



r: Radial position of the measured points

h: Height of the workpiece

Influence of forming energy on the geometry

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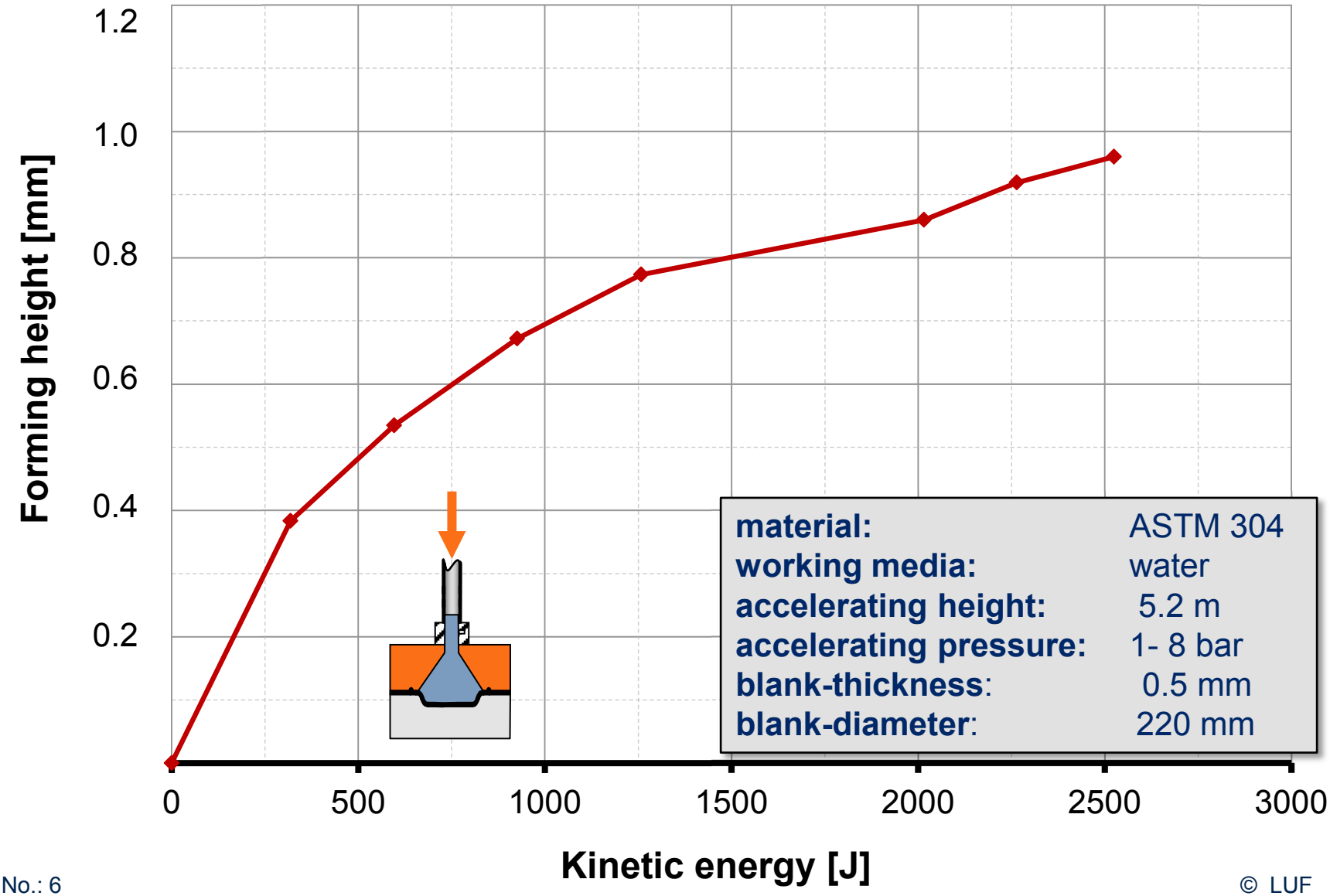

Influence of working-media density

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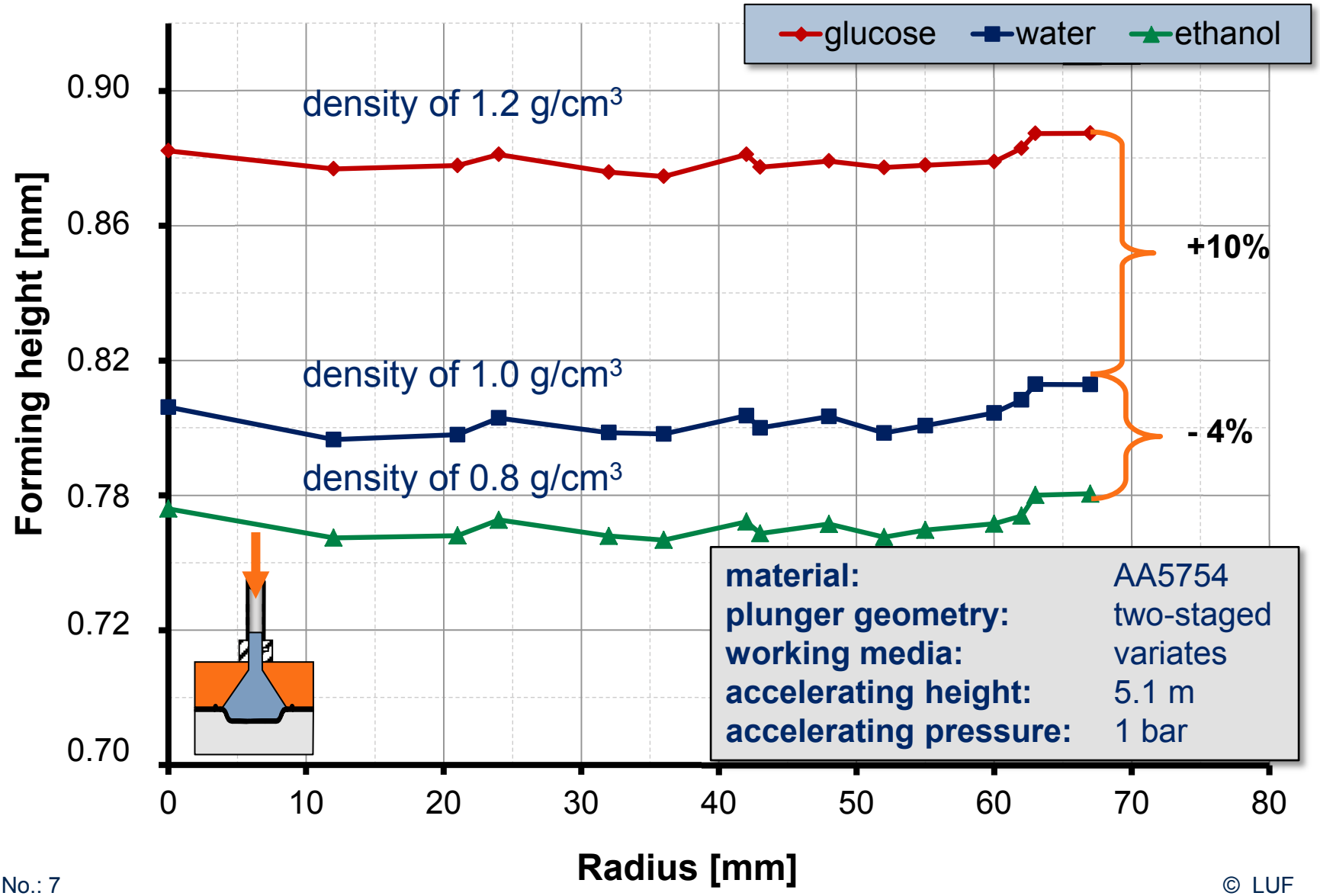

Influence of working media type

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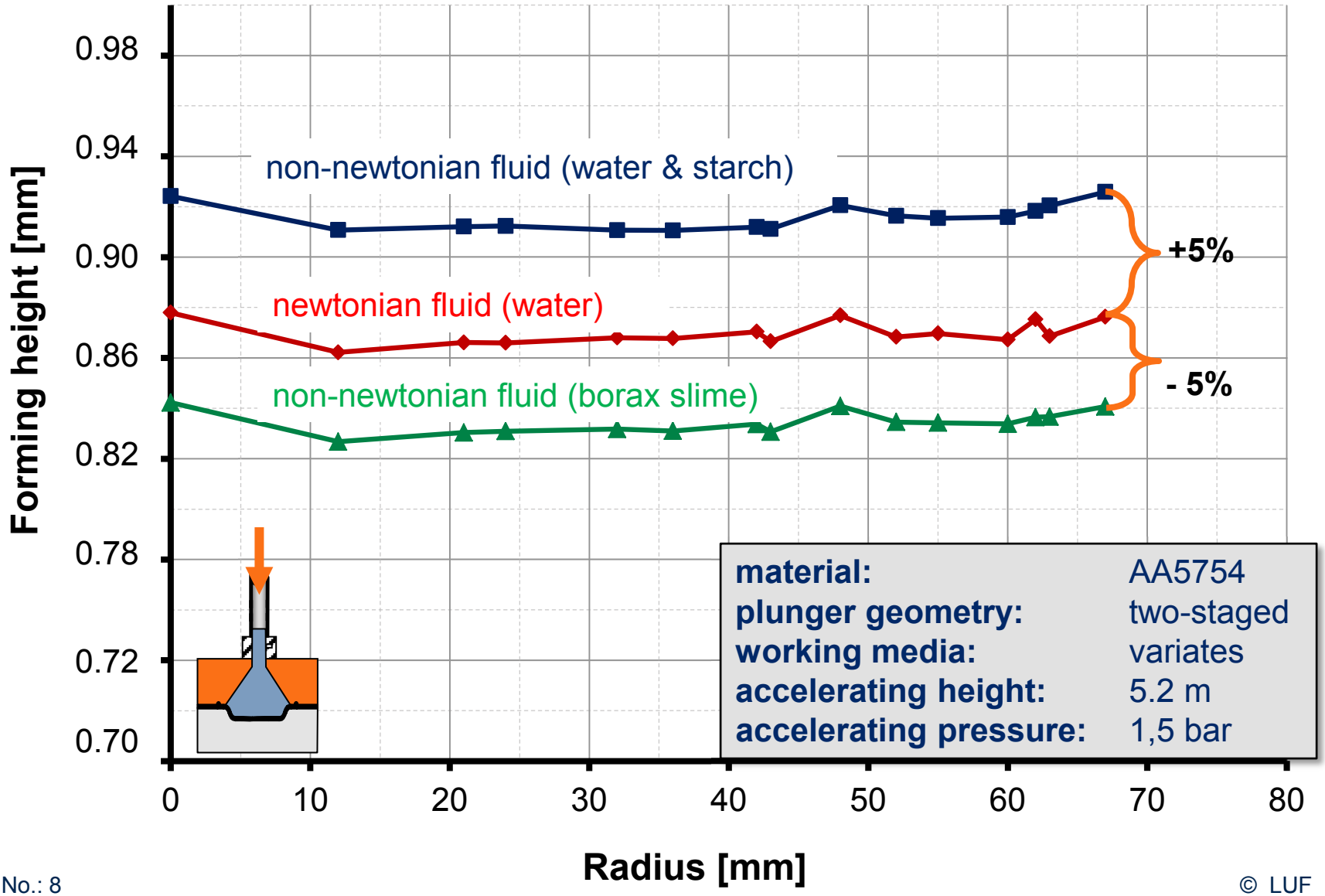

Influence of oxygen content in working media and plunger geometrie

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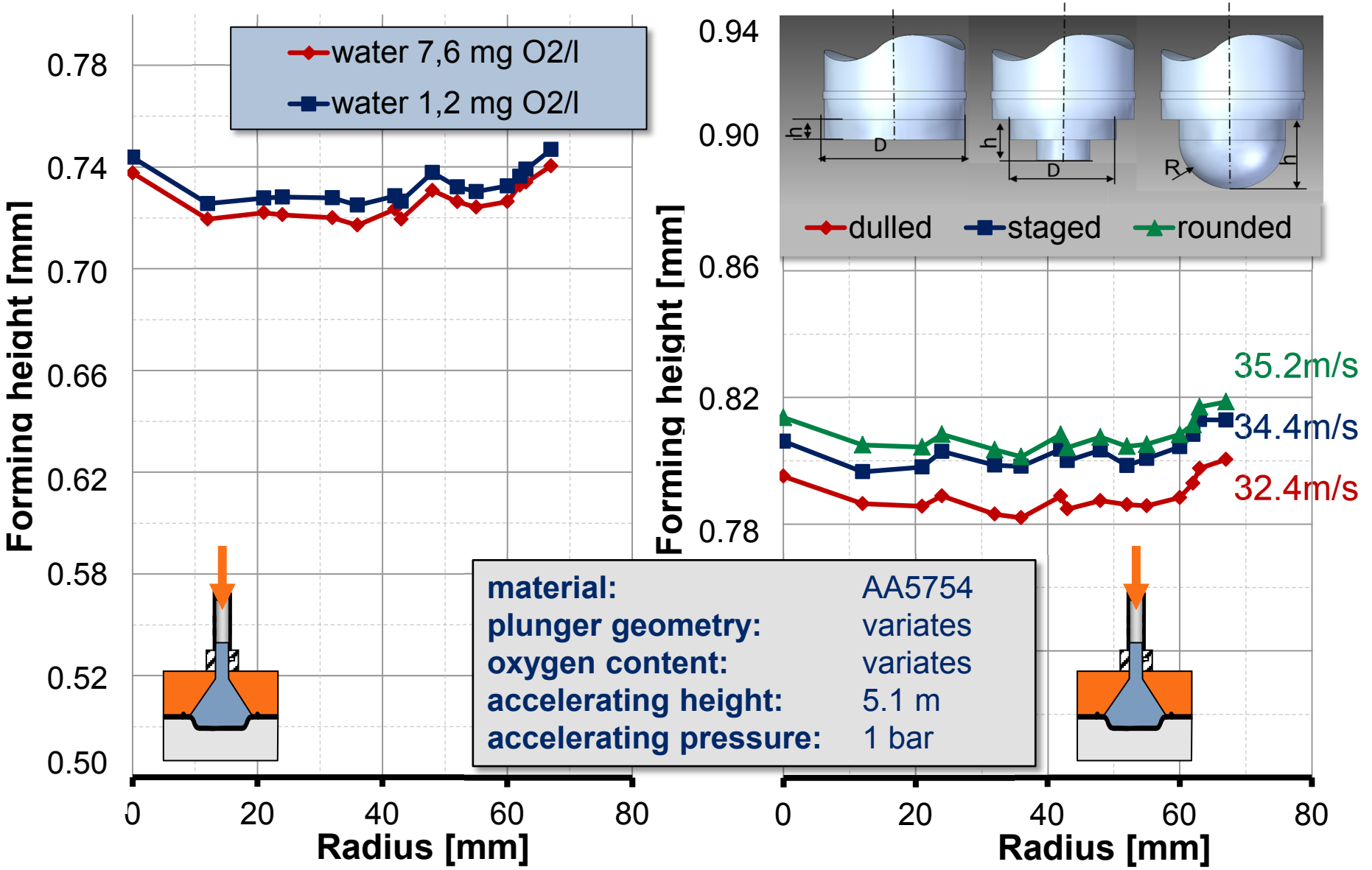

Comparison of pneumomechanical and electrohydraulic forming process

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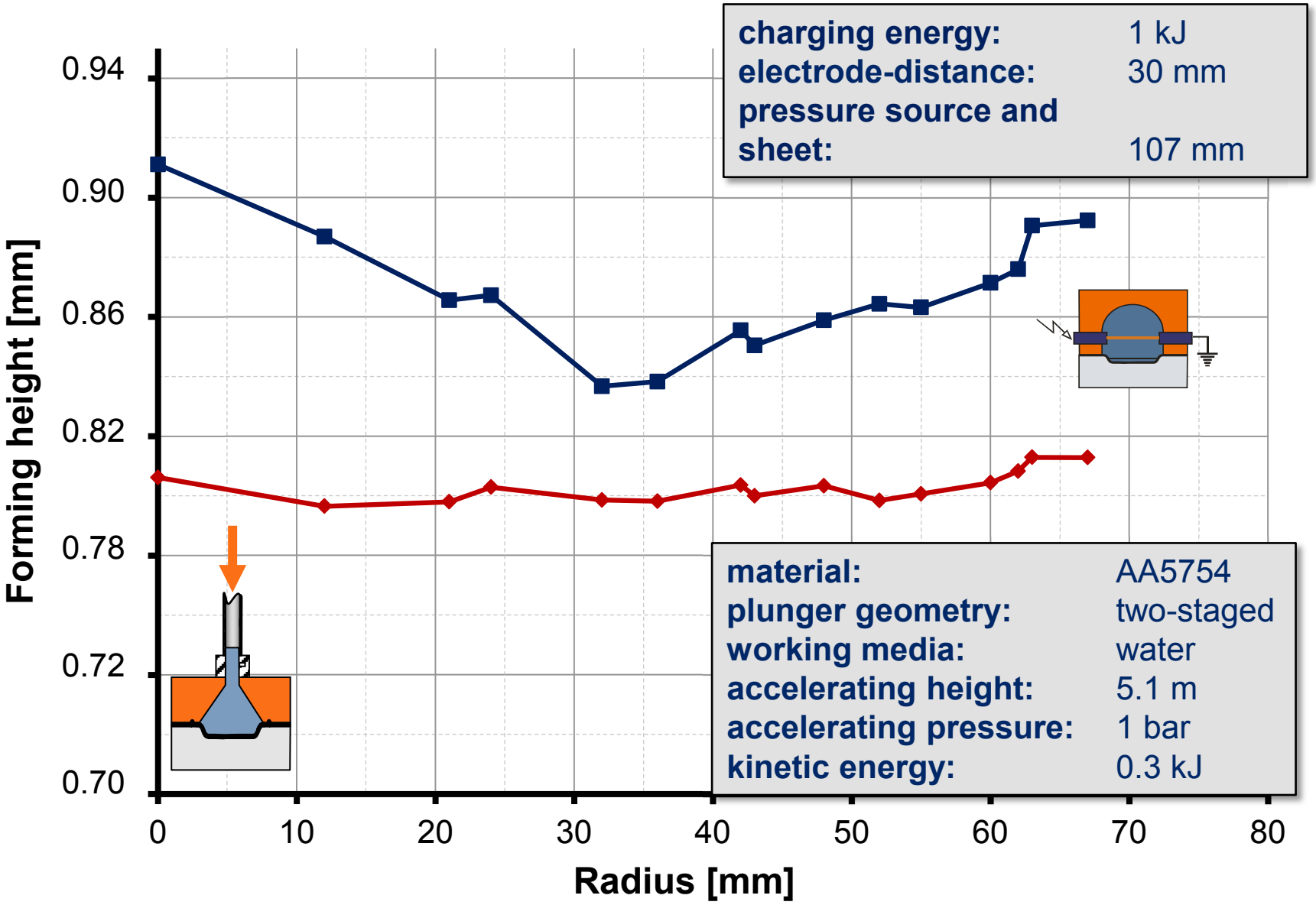

Manufacturing of sharply countered geometries

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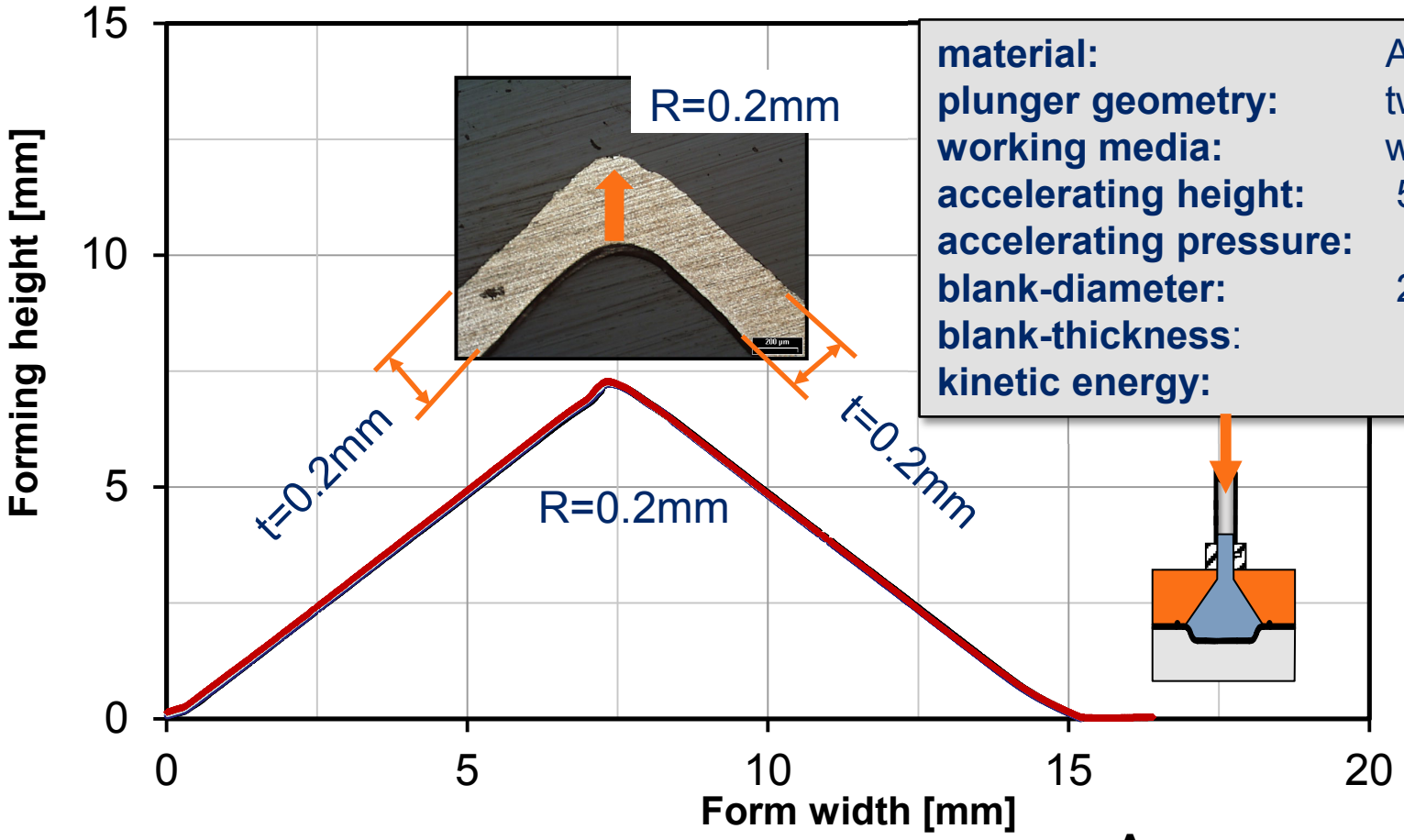
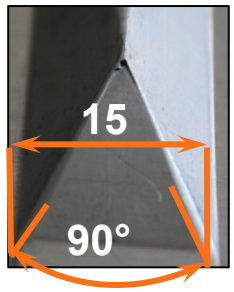
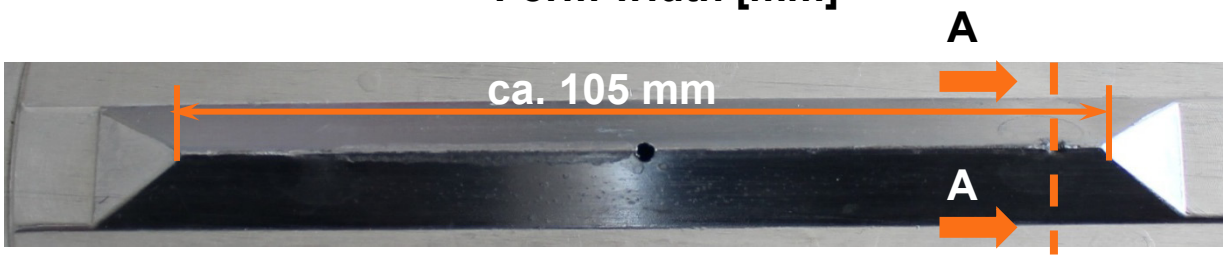


material:	AA1050
plunger geometry:	two-staged
working media:	water
accelerating height:	5.1 m
accelerating pressure:	11 bar
blank-diameter:	220 mm
blank-thickness:	0.5 mm
kinetic energy:	2.8 kJ

E_{kin} = 2.8 kJ





Conclusion and Outlook

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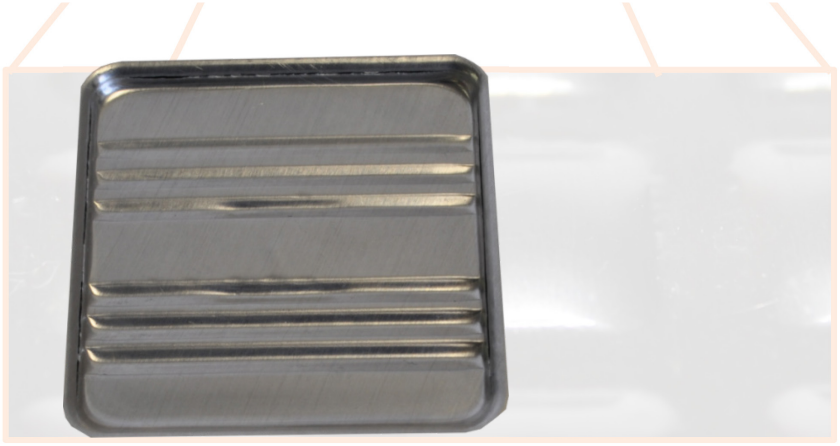
Summary

- Pneumomechanical and electrohydraulic processes are suitable for the manufacturing of sharp edged geometries ($r < s_0$)
- The pressure effect can effectively increase by varying the working media density
- Plunger geometries and oxygen content has only a minor influence on the pressure distribution and height.

Outlook

- Increase the effectivity
- Forming of semi finished parts
- Working media

Thank you for your attention !



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