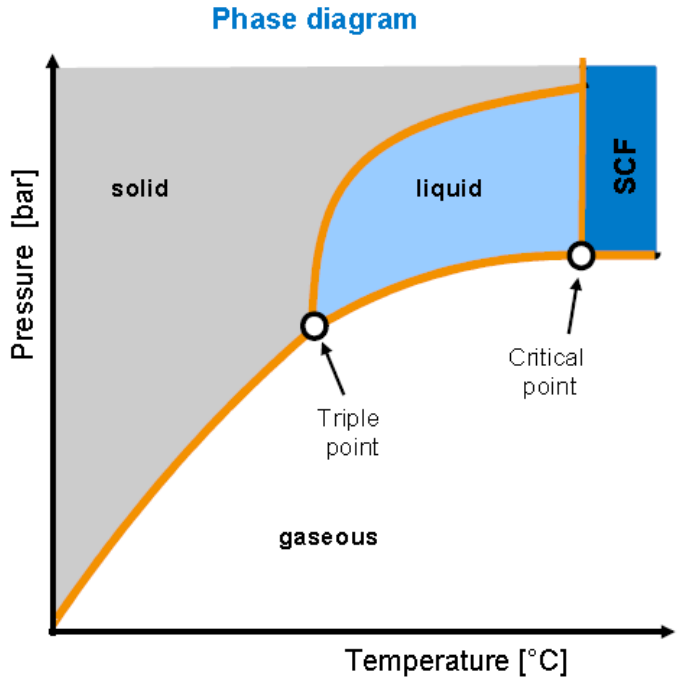
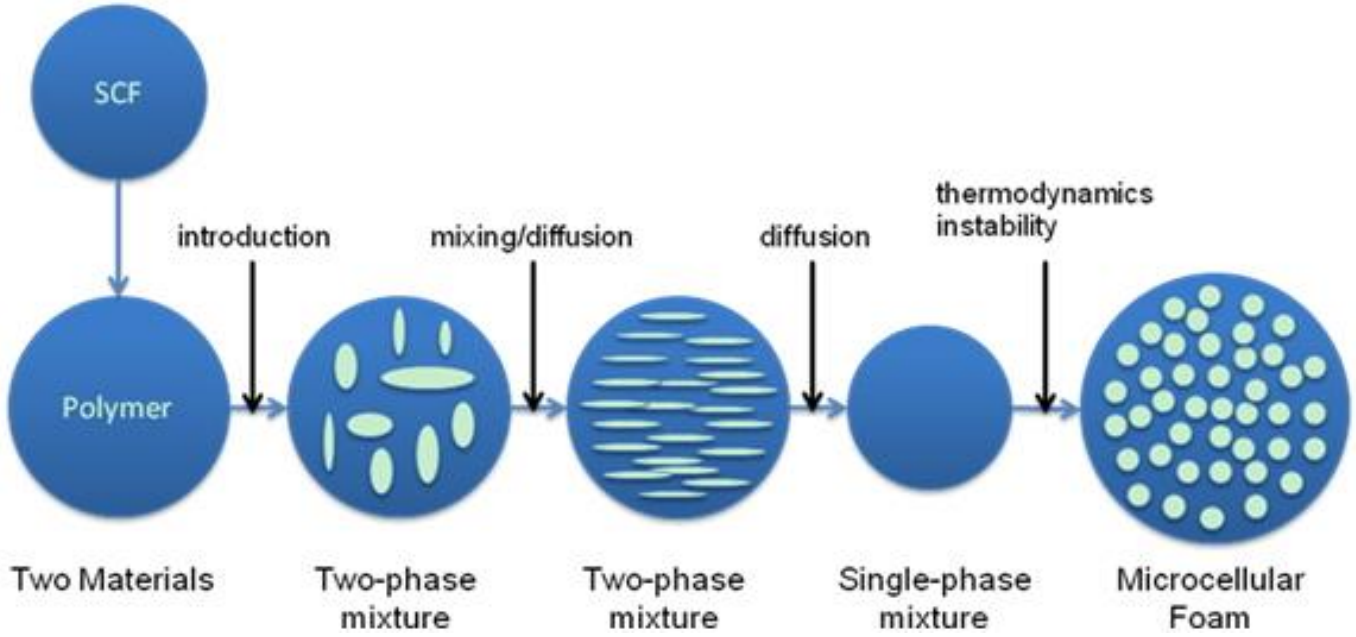
L. Jerpdal

Ku-Fizz

Physical foaming – microcellular injection moulding

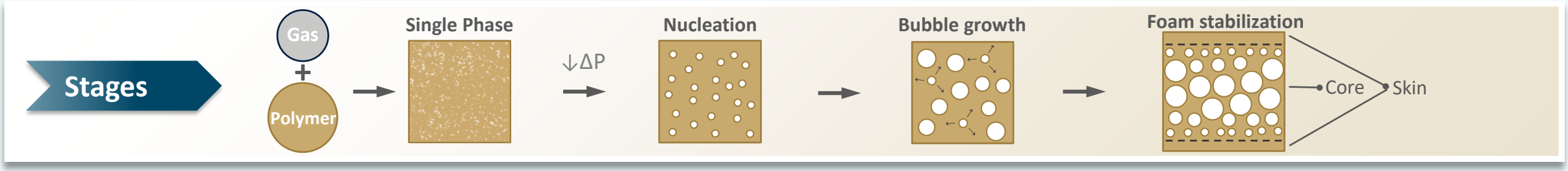




Techniques for physical foaming

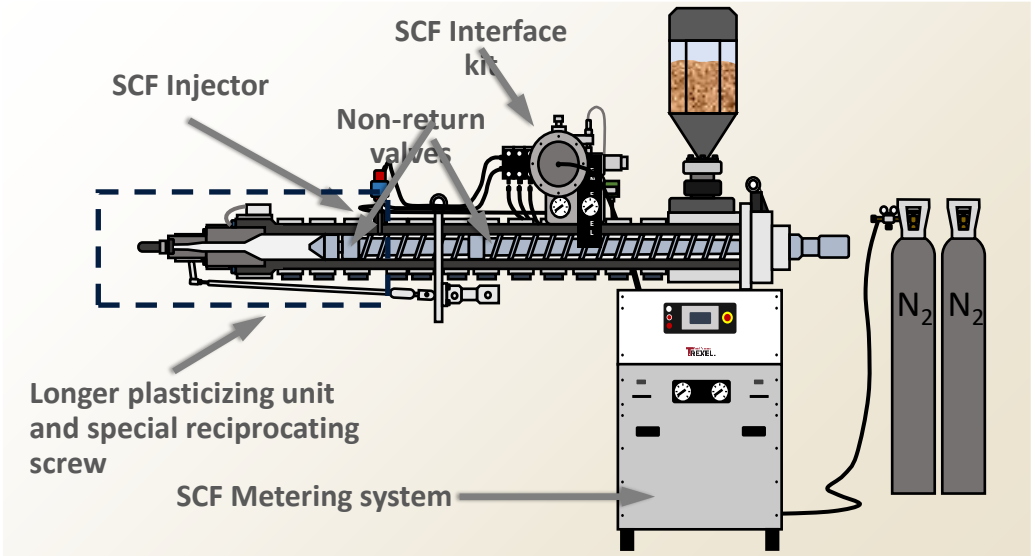
- Several different techniques are commercial available.
- MuCell® is the name of the technique that has been implemented to larger extend for automotive applications.
- MuCell's concept is based on the research from the 70's, and therefore there are much knowledge about this technique.
- Other commercially available techniques are:
  - Optifoam
  - Ergocell
  - SmartFoam
  - Cellmould

MuCell vs. KU-Fizz



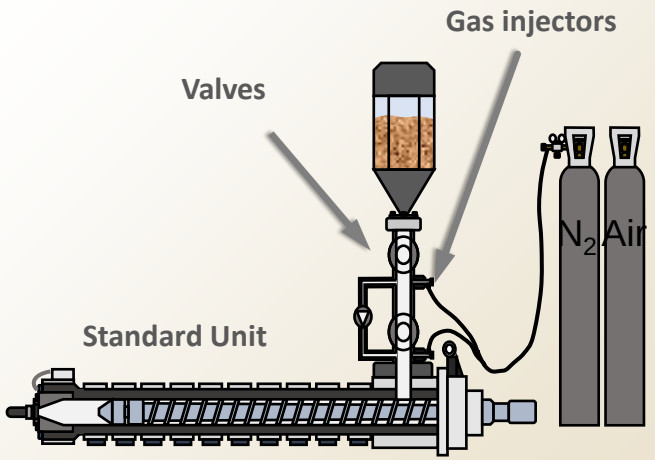
MuCell®

High pressure 250 bar



KU-Fizz

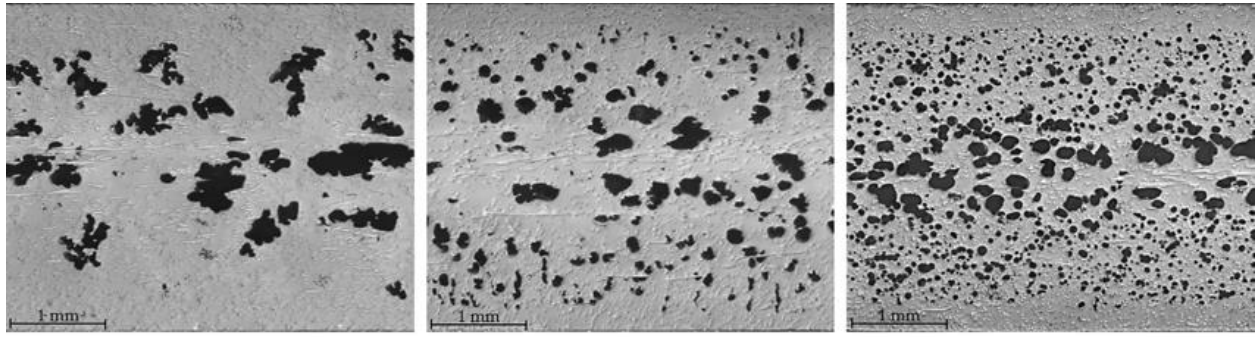
Low pressure 25 bar



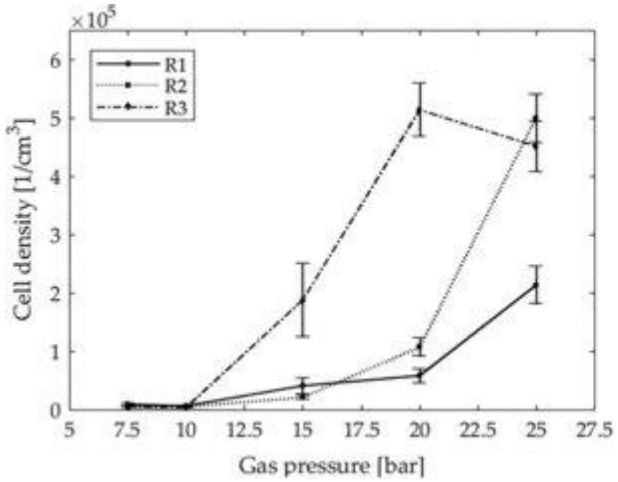
CHARACTERISTICS

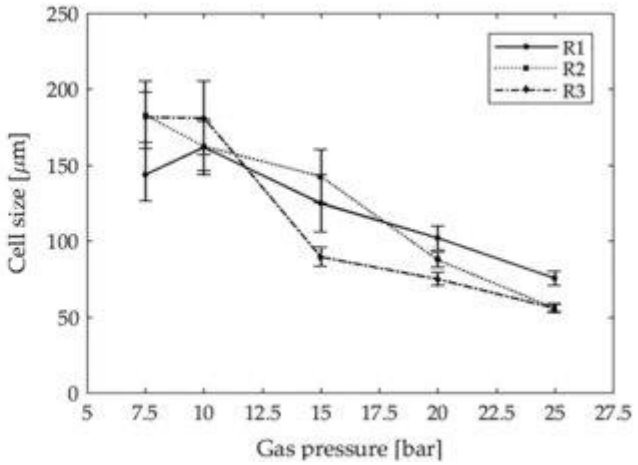
- Lower viscosity of polymer melt
- Lower injection pressure
- Less shrinkage
- More efficient cooling
- 5-30% weight reduction

KU-Fizz cell structure

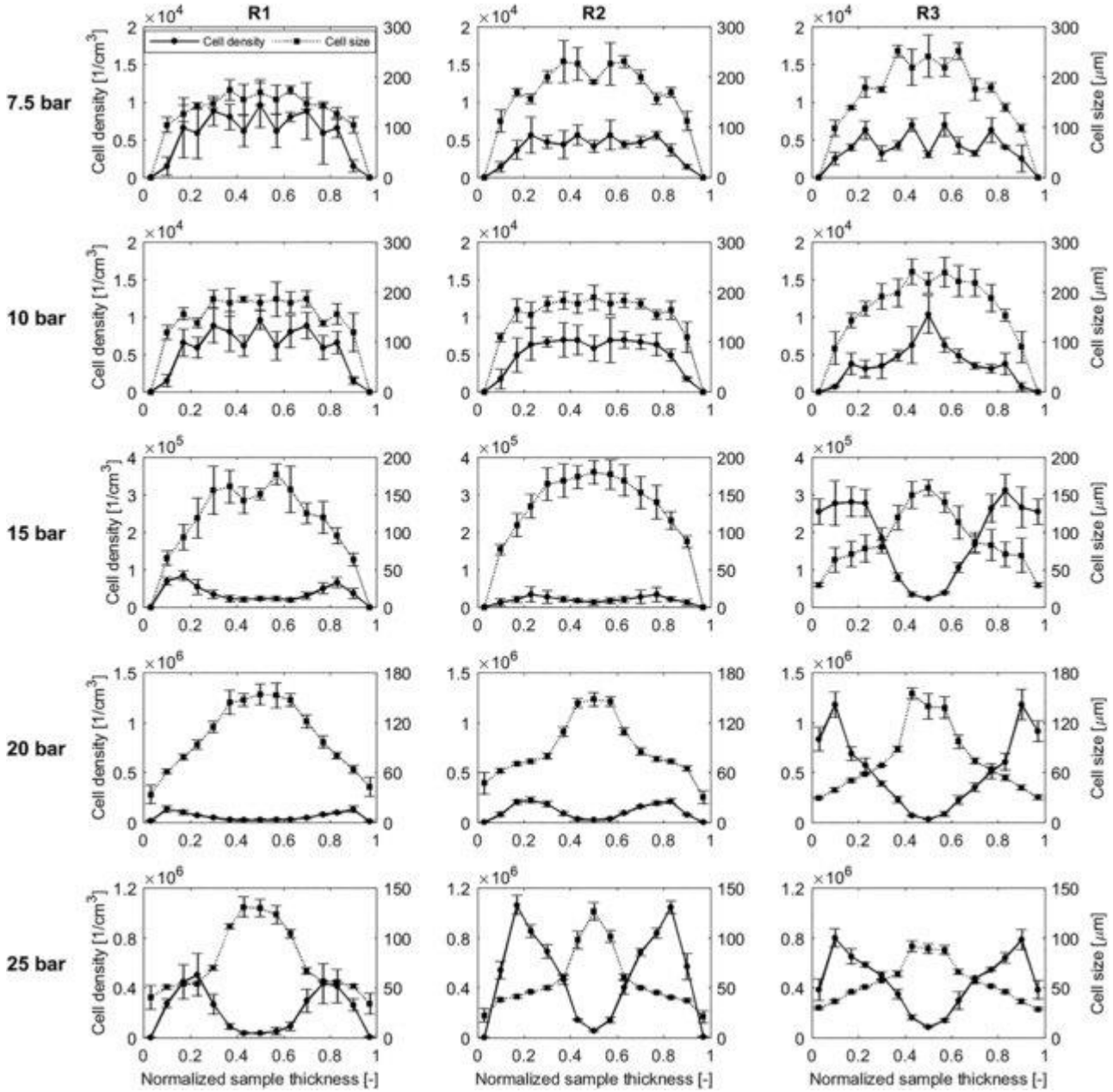


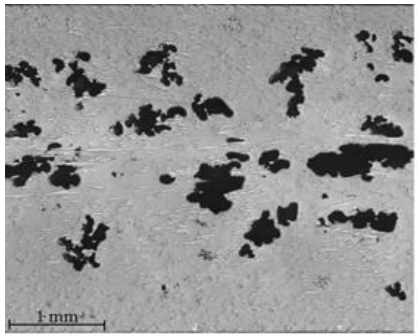
7.5 bar 15 bar 25 bar



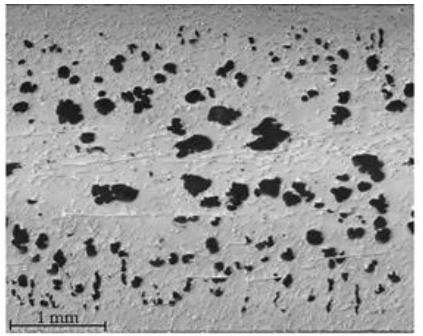


Effect of gas pressure on global cell density and mean cell size, analyzed close to gate (R1), center of the part (R2), and end of flow path (R3)

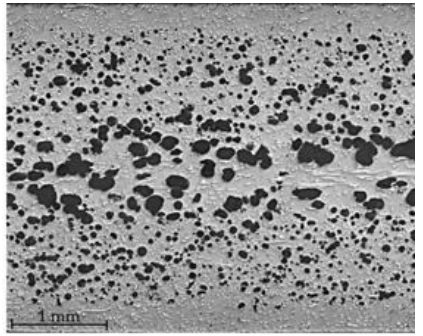




7.5 bar



15 bar



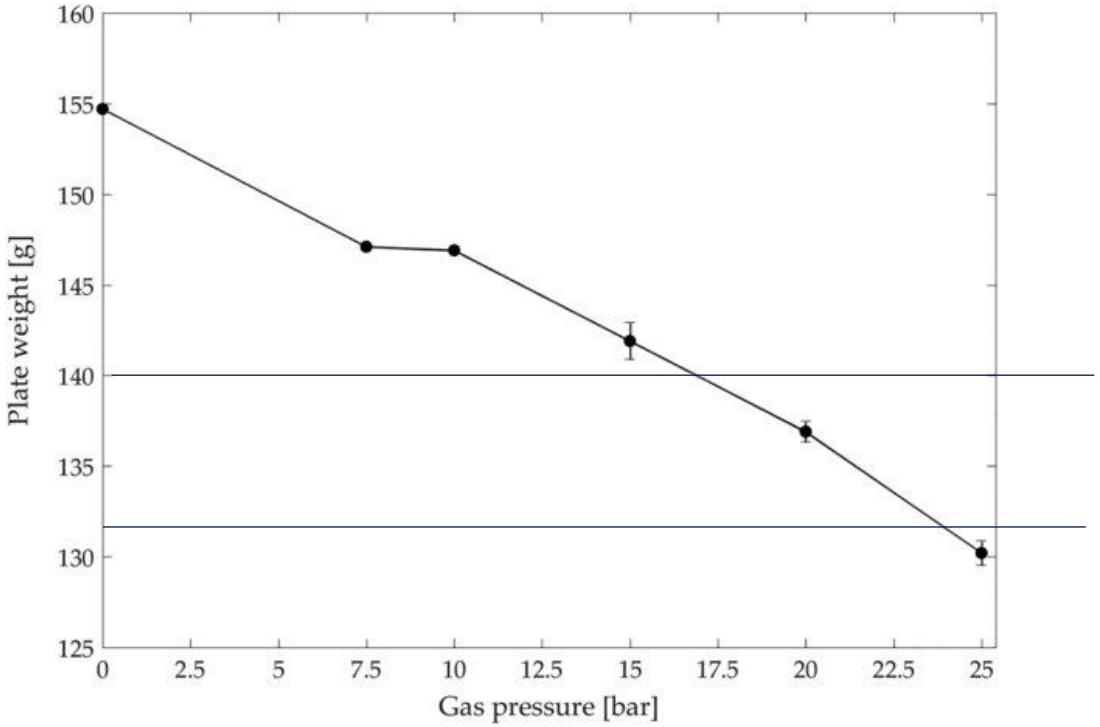
25 bar

Cell density and cell size through sample thickness at varying gas pressures and plate locations,
close to gate (R1),
center of the part (R2), and
end of flow path (R3).

Solid line represents cell density and dotted line indicates cell size

Source: Effect of gas pressure on the microstructure of parts foamed with the novel microcellular injection molding technology Ku-Fizz™

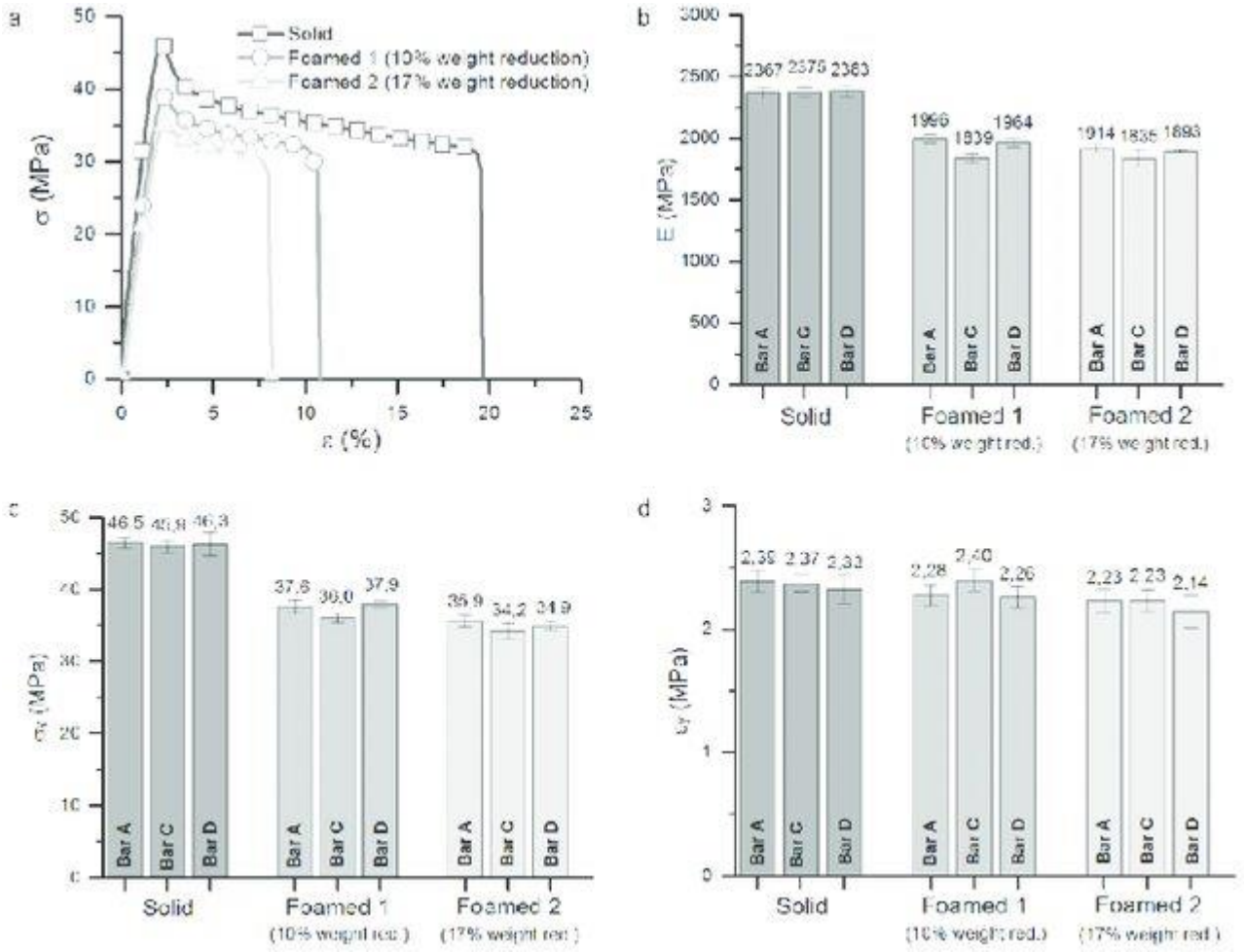
Weight reduction potential with KU-Fizz



-10%

-15%

Mechanical properties influence



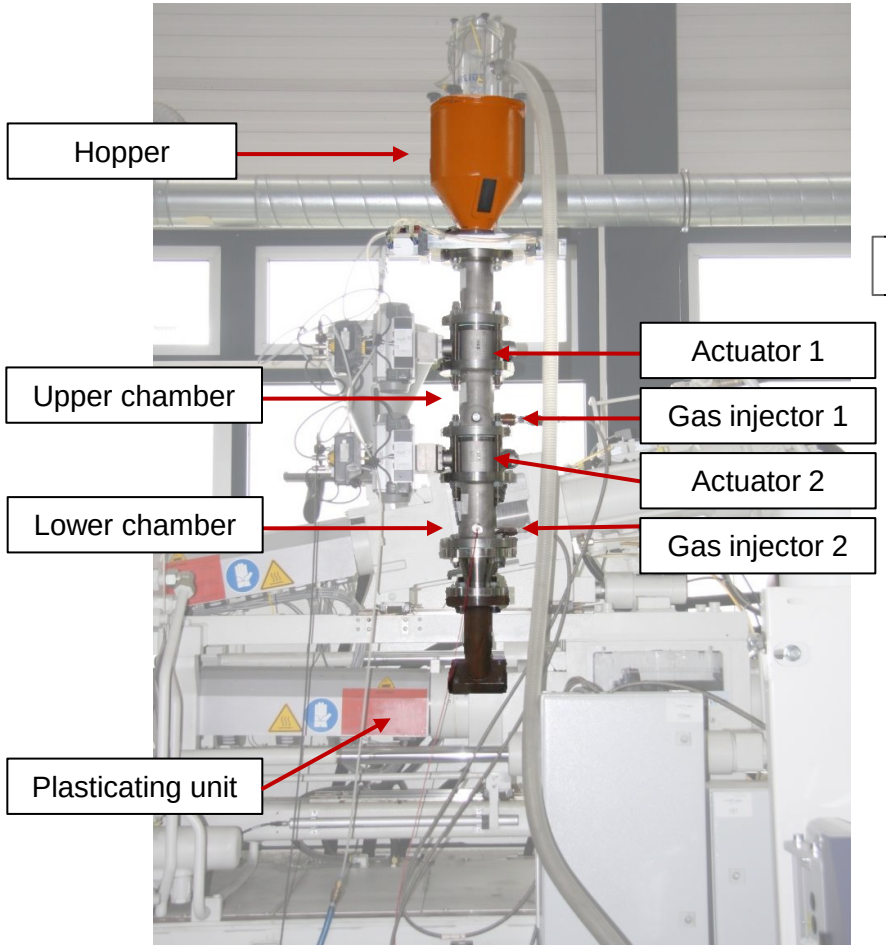
KU-Fizz and sustainability

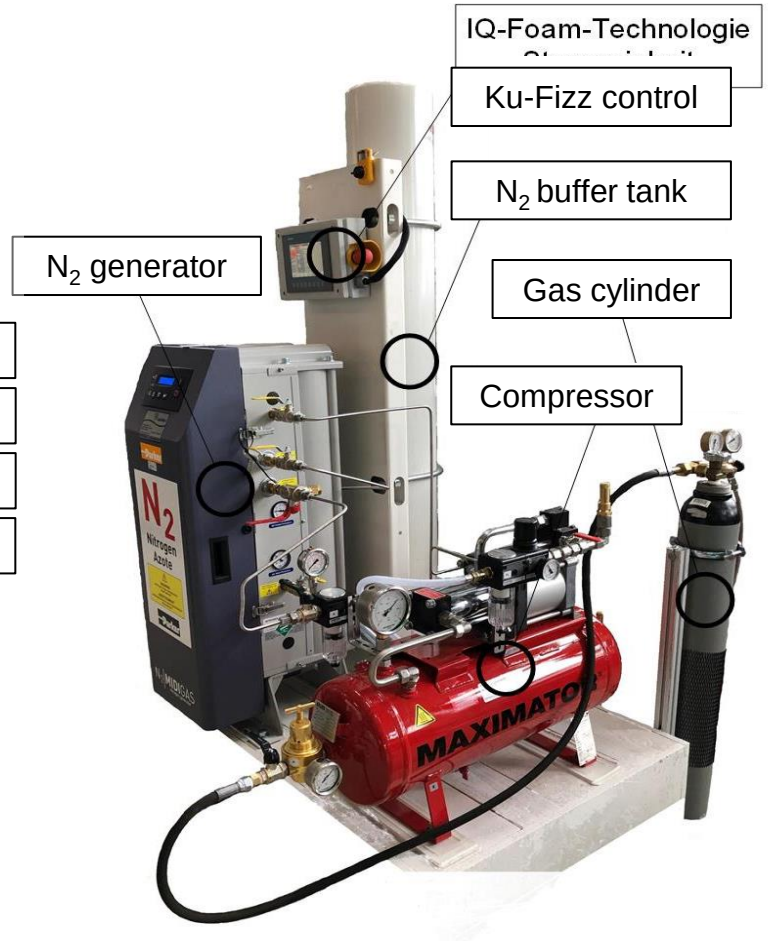
Lower density = less material

Lower CO2 footprint per part
Lower weight results in lower CO2 foot print in use phase for vehicles

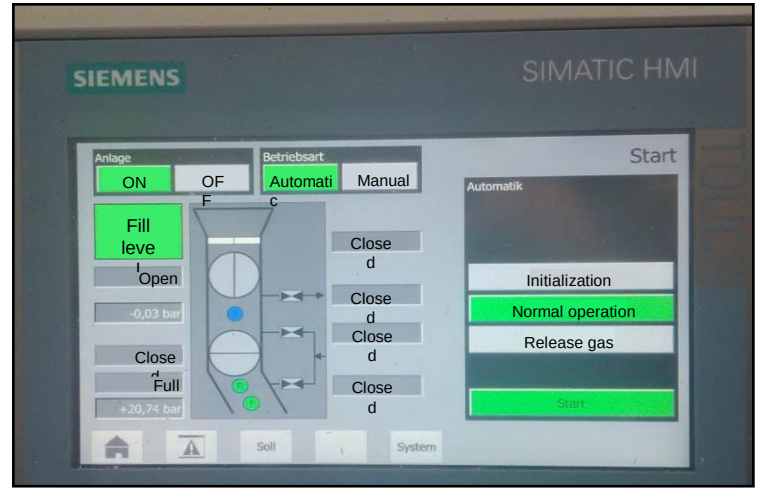
Less energy required in the injection moulding process

In the manufacturing industry



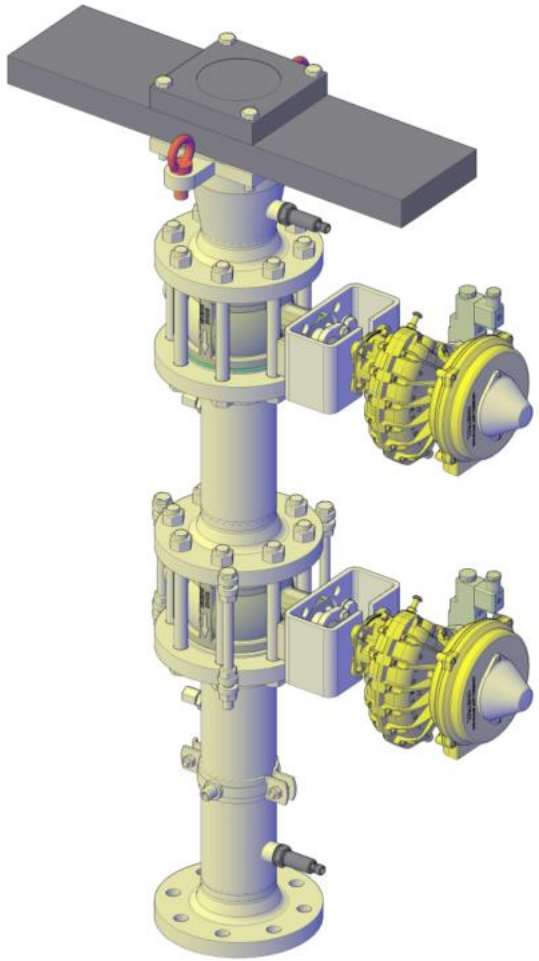


Control Unit



Pressurized hopper with N_2 generator and control unit

KU-Fizz equipment on the market



armatec

polymerinstitutet

KU-Fizz @ PTI


Demag Plastics Group
Sumitomo DEMAG
IntElect 220-1100
KISTLER
polymerinstitutet
Polymerinstitutet ger snabbare vägar till framtidens material och arbetssätt
FEDDE
POLYMERINSTITUTET
SAMARBETEN

Research areas for KU-Fizz

- Nucleation
- Mechanical properties, fatigue properties,
- Reinforcement vs property loss
- Modelling and simulation

Summary

KU-Fizz is key technology for plastics industry in the transition towards net zero industry.

Lightweight
Less material
Energy efficient manufacturing

More research is needed to gain better understanding and to fully utilize the benefits of this technology.