



Solutions for a Better Tomorrow

How to make plastics lighter? Light weighting using *Polybatch* blowing agents

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Agenda

- How can we help?
- Greater lightness.
- How are *Polybatch* foaming additives used?
- How do *Polybatch* foaming additives work?
- Other benefits of foaming with *Polybatch* additives
- A few grams less.
- Advantages of foamed parts produced with core-back technology
- A recent example of advancing sustainable mobility

HOW CAN WE HELP?

■ **POLYBATCH CHEMICAL BLOWING AGENTS**

- are a promising option to reduce weight

■ **POLYBATCH NUCLEATING AGENTS**

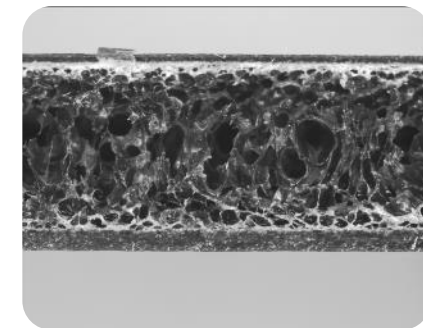
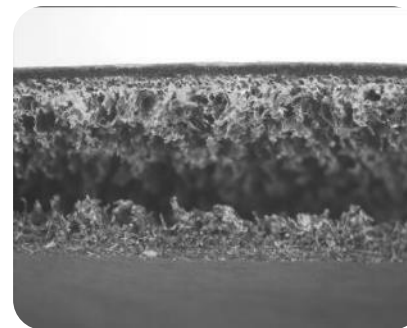
- can help to control cell size and cell distribution

■ **SIMULATION ACTIVITY**

- simulation driven techniques play a crucial role in the development of light weight strategies as well for static load and dynamic / crash simulation.
- the design of structures can be optimized regarding a minimum use of material and better material dispersion

■ **CHOICE OF BASE RESINS, THERMOPLASTS AND ENGINEERED PLASTICS**

- melt strength is of importance



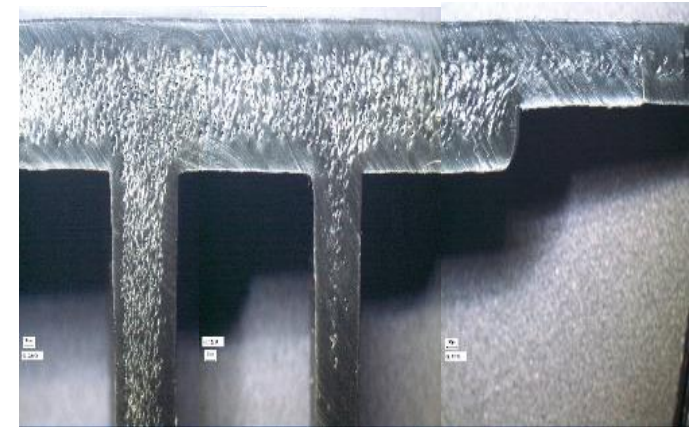
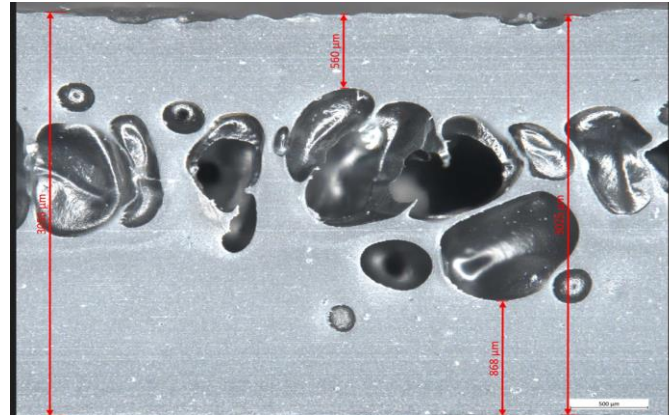
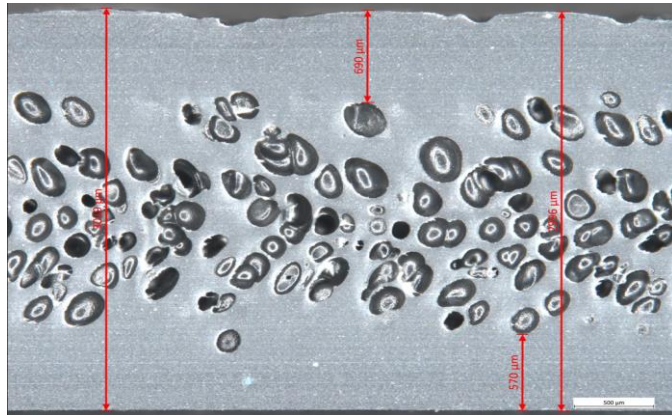
GREATER LIGHTNESS.

■ WEIGHT REDUCTIONS CAN BE ACHIEVED

- between 5% and 30%

■ DEPENDS ON

- technology
- processing parameters
- type and concentration of blowing agents
- article / part design



HOW ARE *POLYBATCH* FOAMING ADDITIVES USED?

- **FOAMING CAN BE ACHIEVED BY PHYSICAL OR CHEMICAL MEANS**
- **CHEMICAL BLOWING AGENTS ARE OFTEN PREFERRED**
 - it does neither require expensive modifications to the equipment nor license fees
- ***POLYBATCH* BLOWING AGENTS ARE SUPPLIED IN MASTERBATCH FORM**
 - the masterbatch is added to the polymer before extrusion or molding
- **TYPICAL ADDITION RATES ARE:**
 - weigh reduction: 1 – 3 %
 - sink mark reduction: 0,5 – 1 %



HOW DOES *POLYBATCH* FOAMING ADDITIVES WORK?

- ***POLYBATCH* ENDOTHERMIC CHEMICAL FOAMING AGENTS DECOMPOSE UNDER HEAT**
- **GASES ARE RELEASED SUCH AS CARBON DIOXIDE AND WATER VAPOR IN THE POLYMER MELT**
 - the gas evolution is controlled by the heat flow
 - the reaction stops when heat is removed e.g., during cooling in the mold
- **THE DECOMPOSITION TEMPERATURE OF OUR *POLYBATCH* CHEMICAL BLOWING AGENTS RANGES FROM 130 TO 230 DEGREES CELCIUS**
 - depending on the endothermic additive used
- **TO AVOID PREMATURE FOAMING**
 - the temperature should be as low as possible in the entrance zone within the processing window of the plastic
 - the injection molding machine should be equipped with a shut-off nozzle

OTHER BENEFITS OF FOAMING WITH *POLYBATCH* FOAMING ADDITIVES?

- APPROVED FOR FOOD PACKAGING (*)
- IMPROVED SOUND INSULATION
- IMPROVED THERMAL INSULATION
- REDUCTION OF STREAKS
- NO POST INFLATION

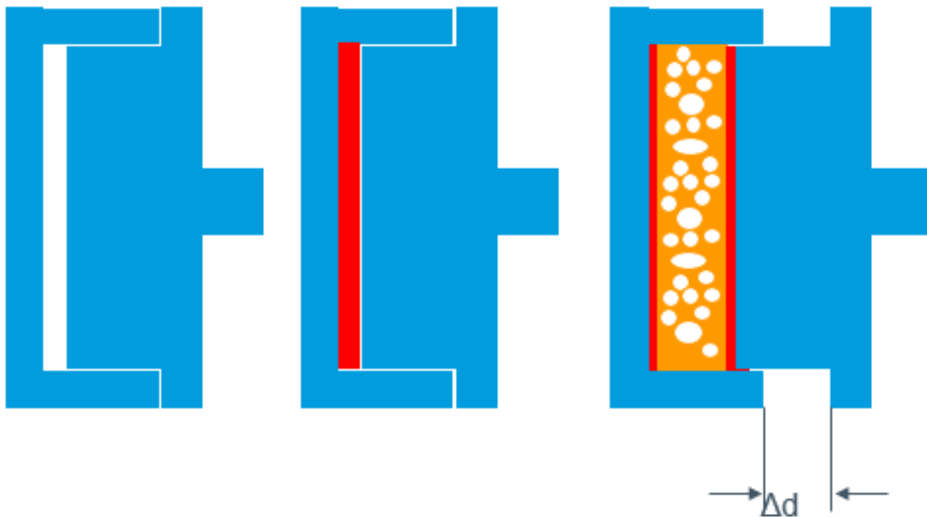


(*): EU legislation

A FEW GRAMS LESS.

■ IN INJECTION MOLDING, THERE ARE 2 PROCESSES

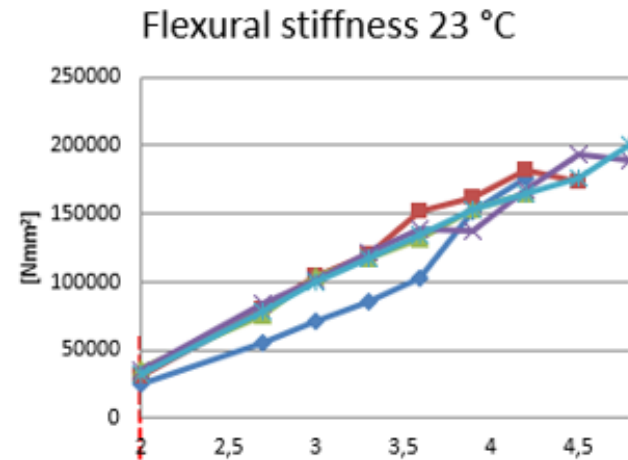
- low pressure process
 - Weight reduction between 5 – 10 % (wall stock of the article maintains)
 - Weight reduction > 10 % (reduction of wall stock in combination with blowing agent)
- high pressure process, core-back technology
 - Weight reduction up to 30 %



Injection of the melt polymer containing a blowing agent, during which a “skin” of compacted solidified forms in the mold surface.

ADVANTAGES OF FOAMED PARTS PRODUCED WITH CORE BACK TECHNOLOGY

- HIGH STRENGTH-TO-WEIGHT AND HIGH STIFFNESS TO WEIGHT RATIO
- LOW MATERIAL USAGE
- LIGHTWEIGHT
 - S (stiffness) = $E \times b \times h^3 / 12$



[Polymers | Free Full-Text | An Approach to the Impact Simulation on Foamed Injection Molded Polypropylene Parts: An Example of Application in the Automotive Industry \(mdpi.com\)](#)

A RECENT EXAMPLE OF ADVANCING SUSTAINABLE MOBILITY

LyondellBasell Advances Sustainable Mobility

With growing concerns about climate change and environmental degradation, sustainability has become a strategic priority for automotive manufacturers. When the BMW Group was looking for a bumper design for a new car model, which had to meet the companies' sustainability goals, engineers from LyondellBasell and two collaborating companies in the value chain took up the challenge.

Quickly, the project team opted for a foamed part to achieve the necessary weight reduction. Thanks to the combination of the expertise from all three companies – raw material, part design & molding and ceramic coating - the foamed part achieved the highest surface/quality ranking and passed a certificated test series with good results.

LyondellBasell's mission was very clear from the start – we had to create a product grade which would allow the production of a lightweight automotive part with an excellent optical appearance. The innovative foaming material is a *Hifax* polypropylene compound which has been used for the 1st time in physical (MuCell) foaming visible parts ever. The foamed lower trim is now being manufactured in serial production.

“This is another example of how plastic material can help in reducing CO₂ emissions,” says Michael Büdinger, Project Manager at LyondellBasell. “The success of this project has not only been achieved thanks to the expertise of all companies involved, but, more importantly, due to their readiness and willingness to change practice. The ‘power of many’ made this project possible”.



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Thank you !



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Coffee Break from **15.15h** to **15.30h**

