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Demonstration of the use of recycled
materials in applications and evaluation

Corrado Cecchini, Electrolux | 11.09.2025 | Brussels, Final Conference



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Demonstration of r Polyol and r MDI in appliance application

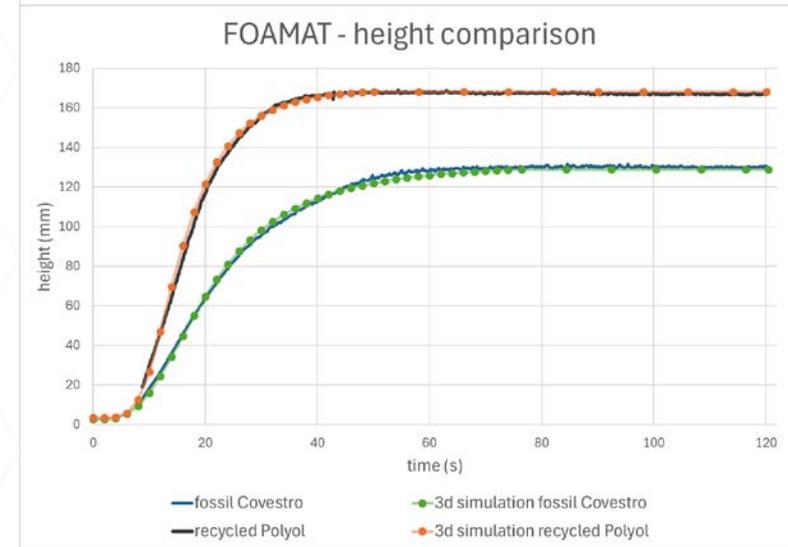
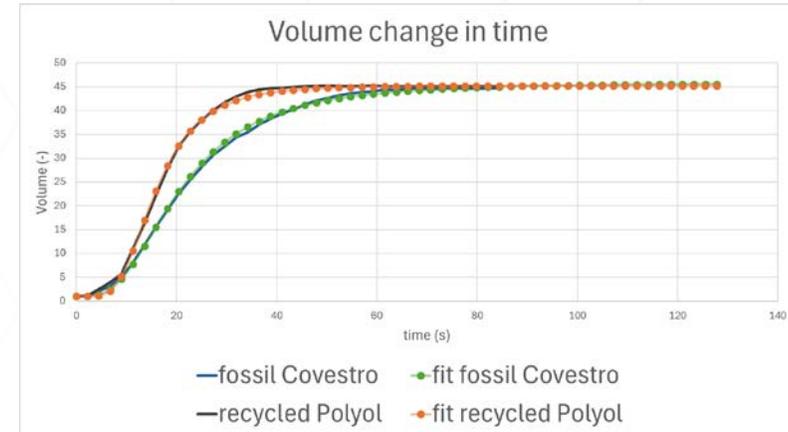
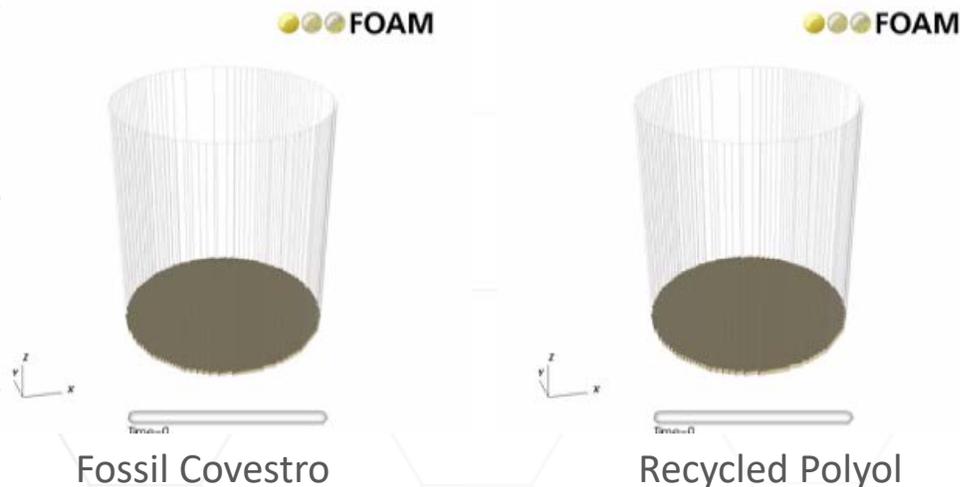
Presenter: Corrado Cecchini | 11.09.2025 |
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Demonstration of r Polyol and r MDI in appliance application - Premise

- **Challenge:** how to compare polyol and MDI from recycling with conventional chemicals from fossil in appliance application, having small samples
- **Solution:** simulate the behaviour of the obtained PU foam in refrigerator filling
- **Highlight:** experimental activity to produce kinetic and thermodynamic data to be used in a further step to tune the simulation software

Experimental: preparation of PU foam by hand-mix and recording of rise curve and reaction parameters

- Calibration steps for foam expansion (volume):
 - We use analytical function fits for foam volume change in time curves.
 - Recycled polyol foam foaming reaction starts and finishes faster than that of fossil foam.
 - Foam heights compare very well with experimental data.



Simulation of the filling of the insulation cavity in a real refrigerator – Boundary conditions

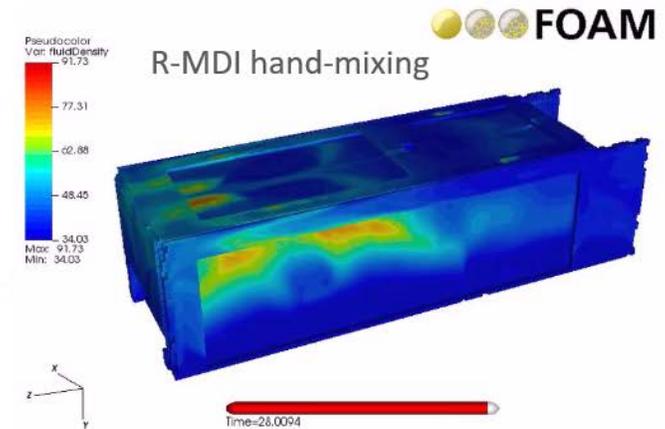
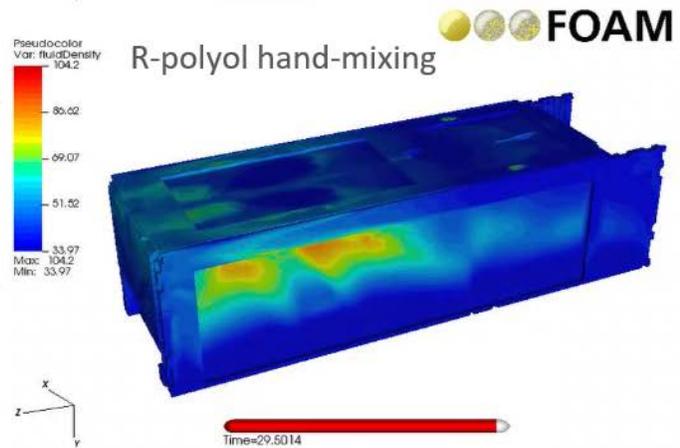
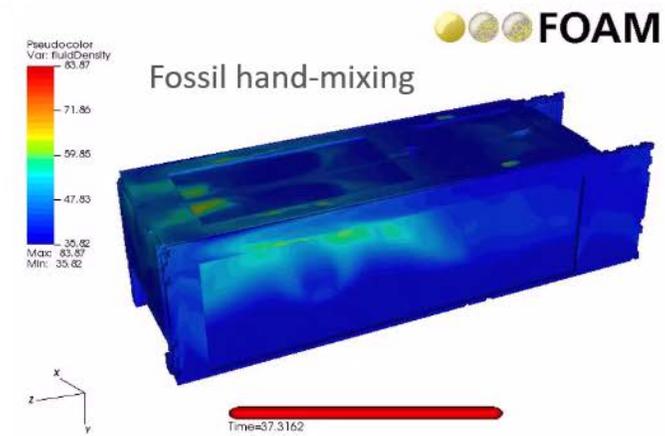
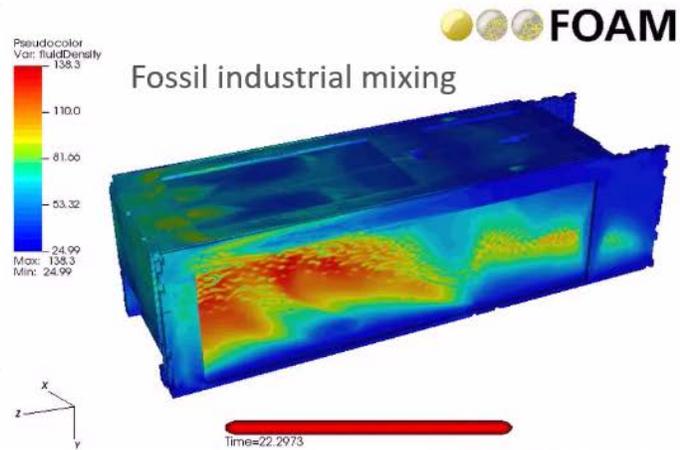
- Mesh size: 2191607 elements
- Injection P1: 1.066 kg over 1.3325 s
- Injection position P2: 1.603 kg over 2.00375 s
- Injection output: 0.8 kg/s
- Wall temperature: 45°C
- Injected material temperature: 20 °C
- Foam density 1228 kg/m³
- Initial pressure 1 bar
- Vents are modeled as permeable wall

17CBMNV0D energy class B



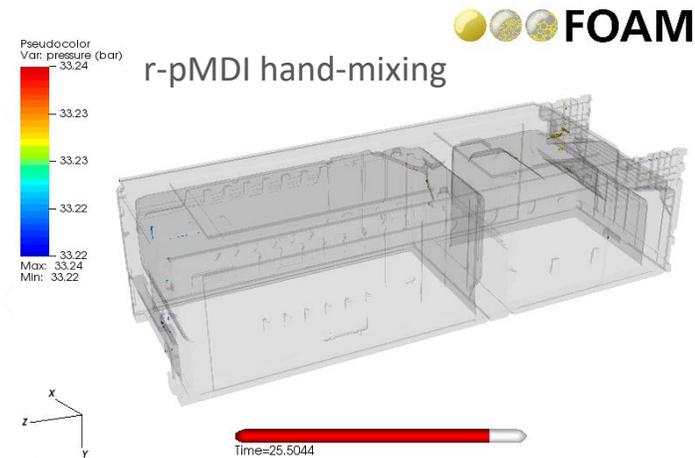
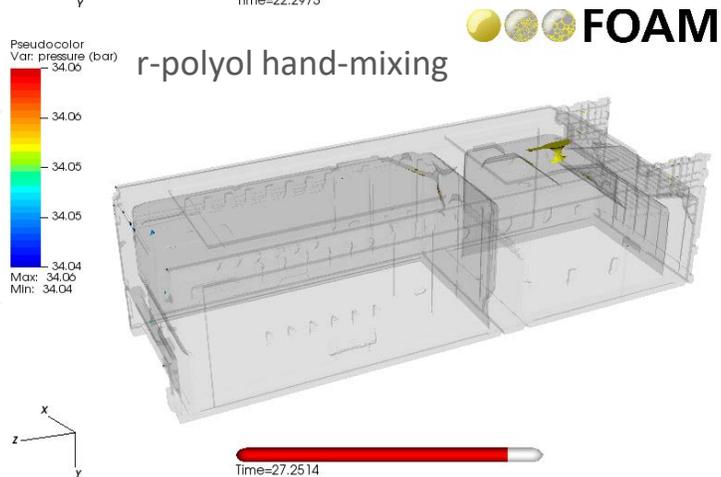
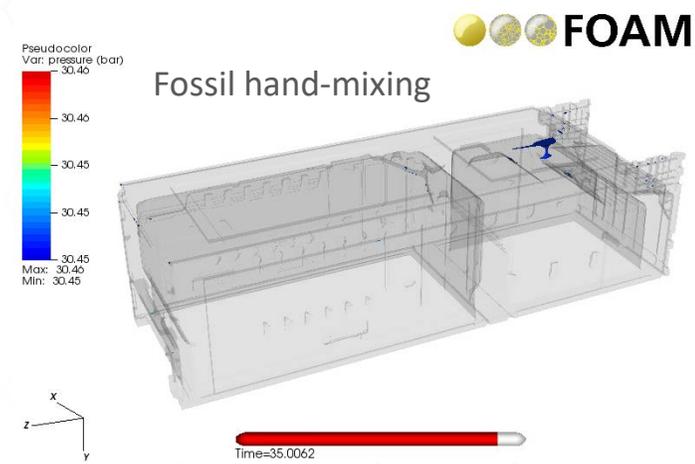
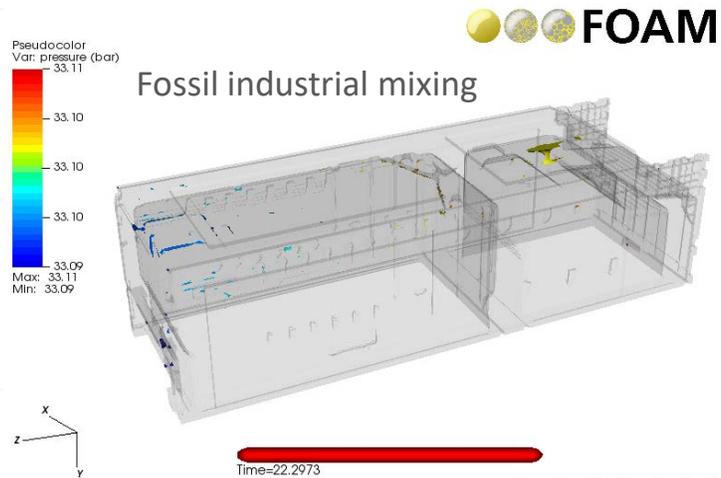
Simulation of the filling of the insulation cavity in a real refrigerator: comparison to fossil standard

Foam density



Simulation of the filling of the insulation cavity in a real refrigerator: comparison to fossil standard

Gas voids pressure



Demonstration of r Polyol and r MDI in appliance application - Conclusion

- A comparative analysis between fossil foams produced through industrial mixing and manual hand-mixing has been conducted.
- Both mixing approaches successfully achieve cabinet filling, with foam behavior differences aligned with expected process characteristics.
- Simulations of recycled foams demonstrate their capability to effectively fill the cabinet geometry.
- Recycled foams exhibit promising potential for industrial-scale application, subject to successful validation through dedicated production trials