

# POLITECHNIKA ŚLĄSKA

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Wydział Mechaniczny Technologiczny



## PRACA DOKTORSKA

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*„Analiza zmian wybranych właściwości polietylenu o dużym stopniu spienienia  
w zależności od składu kompozycji materiałowej i czasu kondycjonowania”*

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## **ABSTRACT**

This doctoral dissertation concerns the analysis of changes in selected properties of closed-cell polyethylene foams with a high degree of foaming, produced by Jiffy Packaging Sp. z o.o., with which the author was professionally connected during the period of research and development of the results contained in the work, while the results of the broadcasts contained in the work were used to improve the technological process of the above-mentioned company in terms of quality. The tests were carried out to assess changes in, among others, stresses during material compression during long-term storage. The reason for undertaking research work, which was the genesis of the work, was the observed decrease in foam stiffness during storage. A decrease in the compressive creep resistance of the foam was also noted (increase in deformation under constant load over the assumed time of 168 hours) during successive series of compression creep measurements. Due to the lack of studies on the effect of conditioning time on the aforementioned properties, samples of the produced non-crosslinked polyethylene foam were subjected to a comprehensive qualitative assessment, including cyclical measurements of compression stress and compressive creep tests. Hardness, dimensional changes, reaction to fire and isobutane content over three months of production were also assessed. The influence of material degassing on the decrease of compressive stresses was investigated and a method of evaluating the creep resistance in the analyzed time of conditioning was proposed using a power function whose coefficients depend on time and compressive stresses.

As part of the research, samples of polyethylene film with the addition of auxiliary agents used in the foaming process were also produced. The impact of the polypropylene block copolymer was evaluated. talc and glycerol monostearate on the crystallinity and gas permeability of the material. The miscibility of polypropylene block copolymer with polyethylene was also assessed.

Due to the scope of research presented above, the literature review focused on the research conducted so far: auxiliary agents and their impact on the properties of foams, miscibility of plastics (in particular polyolefins), mechanics and flammability of foamed plastics.