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NATURAL RUBBER COMPOSITE MIXED WITH POLYETHELENE-ALUMINUM FROM USED BEVERAGE CARTONS WASTES

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INTRODUCTION

Beverage cartons are great at preserving the freshness, taste, nutritional value, and shelf life of their contents. However, with more than 80,000 tons of these cartons being produced annually, their disposal becomes a significant environmental issue. They take over 400 years to degrade in landfills and can cause air pollution when burned.

This research aims to address those mentioned problems by creating a new product using recycled polyethylene-aluminum, or PolyAL, found in used beverage cartons. The PolyAl mixed with natural rubber (NR-PolyAl) will be designed as indoor braille blocks to assist those blind or visually impaired.

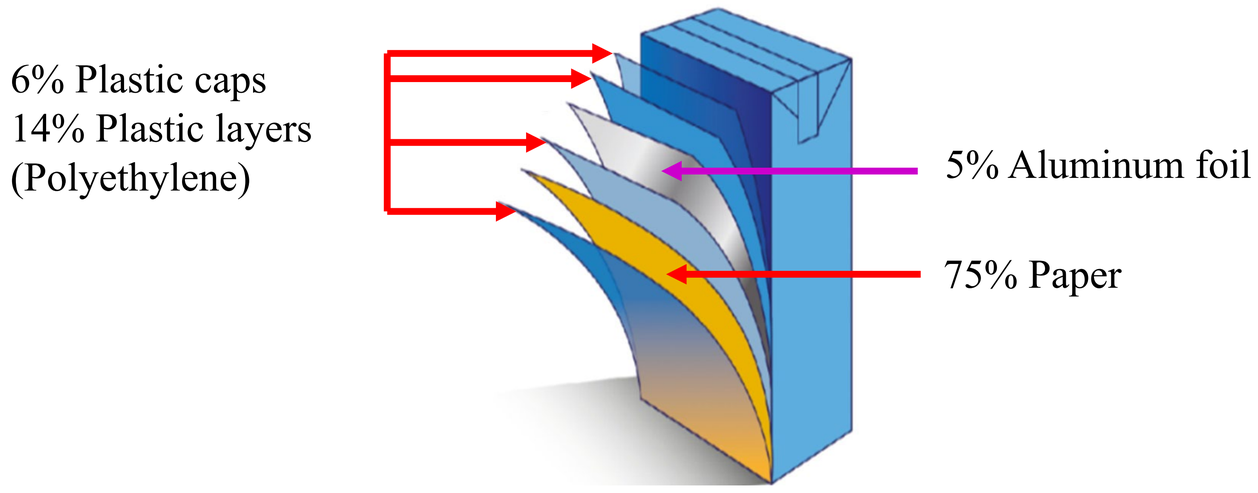

Figure 1: Recycled polyethylene/aluminum films from used beverage cartons

PolyAl (grinding from used beverage carton) Natural rubber (STR5L)

Figure 2: Grinded PolyAL incorporating with STR5L

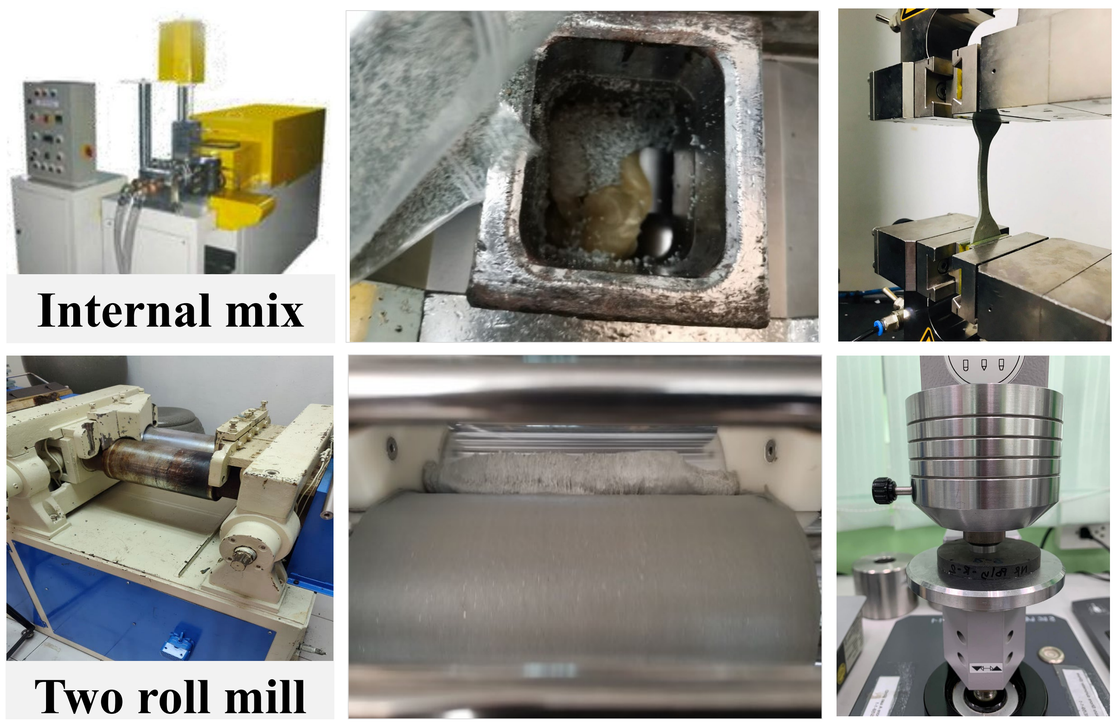

Figure 3: Compound mixing and testing machines

METHODOLOGY

The NR-PolyAl compound was mixed in an internal mixer and a two-roll mill. The NR-PolyAl compounds were prepared in two experiments using specific compositions; 1) NR matrix with PolyAl at 0, 50, 100, and 150 with ZnO, and stearic acid, and 2) NR matrix with PolyAl at 60 phr with CB at 15 phr and PolyAl at 75 phr with ZnO, stearic acid, MgO, and 6PPD. After strowed 24 hrs, TMTD, MBTS, and sulfur were blended and compressed. The samples were tested, including tensile, compression set, hardness, insulation resistance, adherence, and DIN abrasion

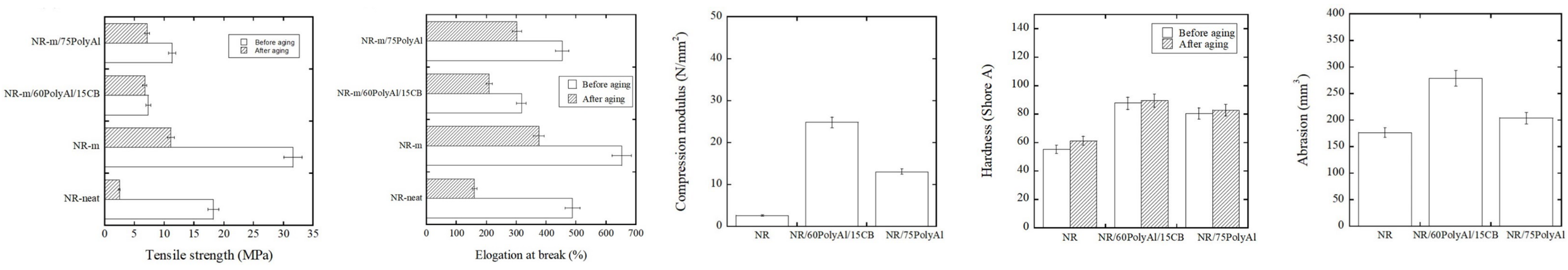

Figure 4: compound was mixed in an internal mixer and a two-roll mill and tested for mechanical and physical properties

RESULTS and CONCLUSION

The research found that the PolyAl reinforcing fillers were very effective in improving tensile strength and elongation at break. After conducting tests, it was found that NR combined with 150PolyAl showed improved 100% modulus, compression set, and hardness. Incorporating magnesium hydroxide led to composites displaying superior mechanical properties in terms of tensile strength and elongation at break, and can use for braille block forming

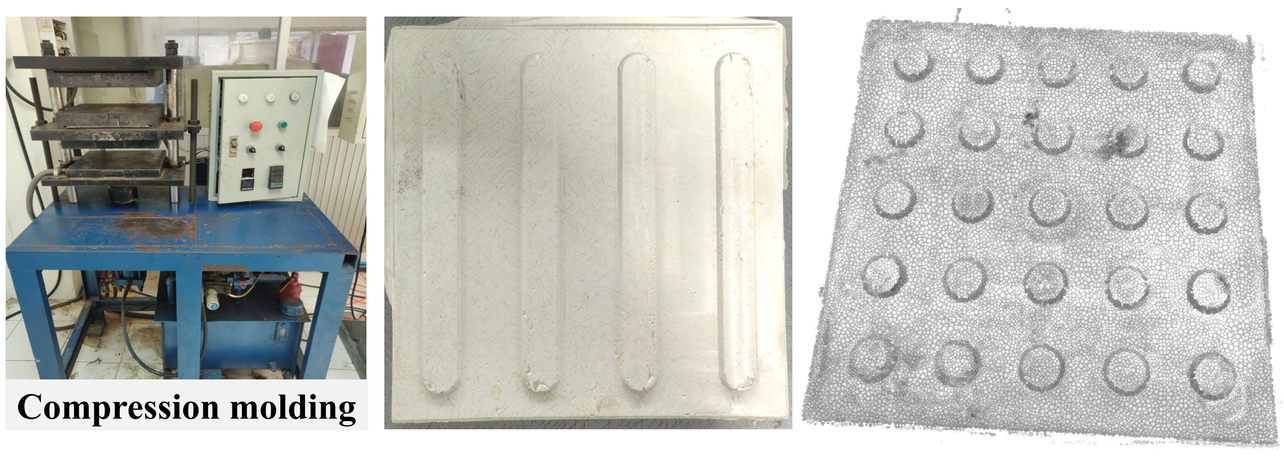

Figure 5: The best NR-PolyAl composite will be compressed in a compression molding machine to create braille blocks