

# Research on the Forming Characteristics of Composite Artificial Stone According to the Ratio of Waste PP and Waste Stone Powder

Jun-Cong Ge\*, Wei Bao\*\*, Eun-Seo Lee\*\*\*, Deuk-Ju Kim\*\*\*, Ji-Ho Kang\*\*\*, Nag-Jung Choi†

\*Division of Mechanical Design Engineering, Jeonbuk National University

\*\*Dept. of Housing Environmental Design, Jeonbuk National University

\*\*\*Art Stone Co., Ltd.

†e-mail: njchoi@jbnu.ac.kr

## 폐 PP 및 폐석분 등 혼합시료의 변수별 복합인공석재 성형특성에 관한 연구

갈준충\*, 포위\*\*, 이은서\*\*\*, 김득주\*\*\*, 강지호\*\*\*, 최낙정\*†

\*전북대학교 기계설계공학부

\*\*전북대학교 주거환경학과

\*\*\*(주)아트스톤

### Abstract

Plastics have been widely used in daily life due to their advantages and together with steel and cement, they entered the top three in the world of the most widely manufactured materials during the COVID-19 pandemic. According to reports, approximately 8 - 11 million tons of waste plastic are discharged into the ocean every year, which will cause serious harm to marine life. Because of their light weight, good toughness and strength, plastics are widely used in plastic bags, packaging, automotive vehicles, electrical appliances, mobile phones and other electronic products. However, plastic (a synthetic resin) is mainly made from fossil oil and gas through polymerization, polyaddition, polycondensation, addition-condensation and other polymerization reactions. It has a long life cycle and strong decomposition resistance. With the widespread use of plastics, the pollution caused by waste plastics is gradually threatening the ecological environment and human health. According to relevant data, as of 2016, about 9 to 23 million metric tons of waste plastics per year were discharged into rivers, lakes and oceans and about 13 to 25 million metric tons per year were discharged into the land environment. If not regulated and treated, the discharge of waste plastics is expected to be twice as much as that of 2016 by 2025. On the other hand, the waste stone powder mainly occurs in the mining and processing of waste concrete and granite at construction sites. Most of the waste stone produced by waste concrete is classified as recycled aggregate for recycling, while the waste stone and waste stone powder produced in the mining or processing of granite are only partially recycled by recycled aggregate, The rest are illegally landfilled or abandoned without authorization, which will lead to certain environmental pollution. Therefore, how to reuse these industrial by-products to reduce environmental pollution is of great significance for building a green and healthy society. The final waste is fly ash, which mainly comes from solid waste discharged from coal-fired power plants. The accumulation of large amounts of fly ash not only consumes a large amount of space, but also causes serious pollution to air, water, and soil. Therefore, it is necessary to improve the reuse rate of fly ash.

In this study, different mixing ratios were prepared to investigate the molding characteristics of composite artificial stones prepared by mixing waste PP, waste stone powder and coconut shell mixtures. The injection molding machine was used to prepare different experimental samples for testing mechanical properties, and different compression molding machines were used to prepare composite floor tile samples.

### Acknowledgments

This research was supported by the Technological Innovation R&D Program (S3288085) funded by the Ministry of SMEs and Startups (MSS, Korea), and the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (No. 2021R111A3056655).

### References

This research was supported by the Technological Innovation R&D Program (S3288085) funded by the Ministry of SMEs and Startups (MSS, Korea), and the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (No. 2021R111A3056655).