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EDITORIAL

Guest Editorial for the Special Issue on "Geosynthetics in Mining"

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The use of geosynthetics in mining has grown continuously since the beginning of the use of polymeric materials in geotechnics and has increased considerably in recent years. In addition to classic applications related to protecting the environment from contamination risks, geosynthetics can sustainably perform a wide range of functions to make the various works and activities inherent in mining industry more efficient.

Solutions with geosynthetics, in addition to being sustainable, must be based on well-elaborated designs, strictly related to manufacturing and installation quality control, to provide excellent physical, mechanical, and hydraulic performance, as well as durability compatible with the requirements of infrastructure works (geotechnics, transport, hydraulics and sanitation).

This special issue of the International Journal of Geosynthetics and Ground Engineering offers high-quality articles with relevant advances in knowledge about the application of geosynthetics in mining activities, including project design, modelling, construction procedures, and developments in laboratory and field tests, installation damage and the effect of tailings on the long-term behaviour of geosynthetics. Case studies on geosynthetic applications in mining are also presented. This special issue includes seven articles ranging from fundamental research to practical implementations. We hope that readers of this special issue find the collection of these articles [1–7] helpful and provide valuable information on their topics of interest. The following description provides a quick snapshot of the articles included in the issue.

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Rarison et al. [1] evaluated the properties of small-scale HDPE geomembranes after 20 years of service in an existing mine cover system. The geomembranes showed an acceptable performance, with the Std-OIT values exceeding the minimum requirement of 100 min for virgin geomembranes. The HP-OIT values are less than the minimum requirement of 400 min, as defined by the Geosynthetic Research Institute (GRI). Tensile and tightness properties meet minimum requirements.

Lira Santos et al. [2] investigated the efficiency of geotextile filtration for large-scale dewatering of two-stage selective precipitation (AMD) acid mine drainage treatment process to recover rare earth element (REE) sludge. Woven and nonwoven geotextiles were used to analyze vertical column filtration in head drop permittivity tests with different AMD precipitate solutions. The nonwoven geotextile demonstrated the highest filtration efficiency (> 90%) compared to a standard woven geotextile (30%) in the worst treatment scenario. Regarding the hydraulic conductivity of the filter cake/geotextile for a test sample, there was no significant difference when varying the flocculation.

Costa Junior et al. [3] presented results of direct shear tests on the geomembrane–soil interface carried out for the coating project of a mining company, where bauxite, a primary natural source of aluminium, is processed. The geomembrane used is of the textured type with different heights of roughness and two types of soil representative of the site (in saturated and dry conditions). The mechanical behaviour was similar considering peak strength and residual strength, and no influence of asperity height on interface parameters was observed. However, in future works, the authors recommend evaluating other texture characteristics.

Kiffle et al. [4] presented four different historical cases of mine tailings in which geotextile tubes were used to illustrate the importance of small-scale or benchtop tests, including the Jar Test, Rapid Dewatering Test and Dewatering Test of Geotextiles. The authors intended to show that geotextile tubes can effectively dewater mine tailings with an initial solids concentration as low as 0.5% to achieve a final solids containment of up to 36%.

Tschöke et al. [5] evaluated the installation damage of a geogrid used in the stabilization function on an unpaved access road designed for ore transport by off-road trucks. The geogrid was placed between a 15 cm base layer and a geotextile acting as a separator and then subjected to compaction under real field conditions. The control and damaged samples were evaluated in the laboratory through visual and microscopic analyses and mechanical tests. The visual analysis indicated the removal of the coating on both sides of the damaged sample, slippage of knots (3%) and small damage to the ribs. Microscopy analysis indicated a significant number of small particles between the filaments due to the removal of the coating. The reduction factors ranged from 1.01 to 1.09 for the secant tensile stiffness modulus and 1.13 for the opening stability modulus.

Castro et al. [6] presented a numerical case study of the application of geosynthetics to make feasible the construction of a mine waste pile embankment by soft foundations treatment. The ease of installation process and the large strain capabilities made possible an embankment construction on soft soil near an industrial mine plant. The authors discuss using critical state soil mechanics and the stress–strain finite element method to assess the need for treatment on the foundation for embankment construction in soft material. The numerical results showed that the solution proposed with the numerical analysis reduces the reinforcement that would be offered usually.

Finally, Shireen et al. [7] presented the shear strength characteristics of a new lightweight landfill material comprising waste ash and scrap tire granules. Large-scale direct shear tests were carried out. The shear strength characteristics of the bottom ash granule mixture interface with uniaxial polyester geogrid of different aperture sizes were analyzed. The test conditions analyzed showed that the mixture of unreinforced and geogrid-reinforced bottom ash granules indicated the suitability of this mixture as fill material in reinforced retaining structures.

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Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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