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DEVELOPING WATER EXTRACTION MINING MODEL FOR ISRU TO SUPPORT A MARS COLONY

Abstract

Previous work conducted by the authors focused on developing specialised models intended to explore the commercial potential of extracting water on Mars. This initiated using a formal-systems architecting framework, to define a Mars Colony Architecture Model (MCAM), associated with a variety of analytic models. MCAM then is integrated with an Extraction Mining Model, an Infrastructure and Integrated Logistics Support (ILS) Model, and an Economics Integration Model. This paper is particularly focused on construction of the Extraction Mining Model through pre-selected mining systems associated with in-situ resource extraction and / or processing, storage and handling, and haulage. For each mined resource, the model computes the production rate as a function of the systems' technical parameters and the local Mars environment. The developed tool is named the Water Extraction Mars Mining Model (WEM3) and is currently being used by Jet Propulsion Laboratory.