How to apply the ERP model for Smart Mining?

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Abstract. For a long time, and especially today, the energy crisis has been a limiting factor for the growth and development of the world economy. On the other hand, improving the reliability and readiness of energy production systems is becoming a first class priority for research and development institutions around the world. Therefore, the process of production, transport, distribution and usage of energy is increasingly becoming a very important part of smart systems, whose basic framework is Industry 4.0. Thus, starting from the analogies between industrial manufacturing and mining (i.e. "ore production"), the concept of smart mining is developed. This model has three dimensions: (i) application of advanced digital technologies (Cloud Computing and Internet of Things) with automated Cyber-Physical Systems (CPS), Adaptive Manufacturing Processes (depending on working conditions) and Control of Manufacturing Processes (with optimal resource usage); (ii) Smart Maintenance of CPS (for machinery and equipment); and (iii) Smart Supply Chains (procurement of materials and spare parts / delivery of final products). Deeper analyses have shown that most of the Industry 4.0 elements could be applied with some modifications in mining (there are 45 in total, and analyses have shown that 32 of them can be successfully applied in smart mining) – which was the starting point for the ERP model presented in this paper. The developed ERP model has three main parts: a virtual part based on the Cloud Computing model (SaaS model) and us-age of Internet of Things to connect different business processes (procurement, sales, management, finance, warehousing, downtime monitoring etc.), the manufacturing part (coal production in open-pit mine) and the technology process part (monitoring and maintenance of auxiliary machinery). This paper presents the developed and partially implemented ERP model for Industry 4.0 in smart mining at one surface coal mine in the Republic of Serbia.

Keywords: industry 4.0, mining, ERP

The full paper is published in MATEC Web of Conferences, Volume 368 (2022):

DOI: https://doi.org/10.1051/matecconf/202236801015