# DEVELOPMENT OF THE SMART BIT CONCEPT FOR AUTOMATION OF MECHANICAL ROCK EXCAVATION UNITS

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Two of the persisting health and safety issues in the global tunneling and mining industry are ground control and dust. Automation of the equipment will allow for removal of the workers from the potentially harmful conditions in the mine. This paper focuses on development of the "Smart Pick" concept which is a key component of automating the mechanical rock excavation units in various mining operations such as roadheaders, continuous miners (CM), long wall drum shearers or plough, borer miners, and surface miners. The process involves development of the load sensing system to monitor the cutting forces on the pick, wireless communication of the data from the drum to the machine, and pattern recognition algorithms to identify the rock being cut using machine learning (ML) and artificial intelligence (AI) systems. This enables the machines to operate without the need for the presence of personnel and their exposure to possible health and safety risks. With the successful measurement of the cutting forces and communication of the data to the processing unit, the machine can monitor the bit wear condi-

tions based on the comparison of forces in the same rock formations. It can also sense the change in forces with the pick at given wear condition and identify the rock formations being cut by comparing the signature force traces for cutting various rock types that have been catalogued in the library of rock types by the machine. An overview of the project and its current status, in addition to the results of initial testing will be offered.
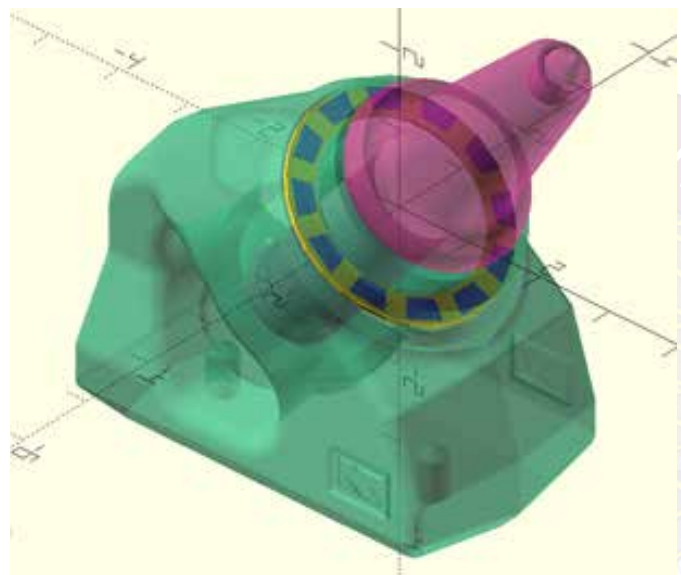
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