BACKGROUND
Atlas Copco Rock Drills AB is a manufacturer of underground and surface rock excavation equipment. Algoryx Simulation AB provides dynamics simulation. The interaction of vehicles with ore and muck can have huge impact on vehicle performance and lifetime.

The goal of the project was to simulate the dynamic behavior of the ore-bodies in interaction with each other and the vehicle in order to gain understanding and provide even more successful vehicle design. The project was part of Simovate, which was partially financed by Vinnova – Sweden’s Innovation Agency.

CHALLENGE
When designing new dump boxes for underground mining trucks, the interaction of the dump box with the ore is important. Are there any critical regions? What are the influences of the driver’s behavior, material properties and load on machine wear?

Measurements in real-world scenarios can be hard to come by, prohibitively expensive or dangerous. Building physical prototypes can be time-consuming and expensive.

Furthermore, one would like to gain early knowledge about the performance of a virtual prototype in realistic scenarios already during the development stage, when it is easier to adapt design choices.

OUR SOLUTION
Atlas Copco provided Algoryx with concept and construction CAD-models as well as physical properties of various machine parts.

Algoryx applied the physical properties to the native CAD-models using Dynamics for SpaceClaim, and placed the machine model in modifiable dynamics simulation environments with thousands of ore bodies. Algoryx provided a scalable and fast tool allowing Atlas Copco to run, modify and analyze simulations.

With increased understanding and in discussion between Atlas Copco and Algoryx, tools and models where gradually adapted and adjusted during the project phase.

BENEFITS
The project resulted in an increased understanding of the processes involved in the machine work cycle.

Simulations on an existing dump box for the mine truck MT42 gave insight on the load distribution during different stages in the work cycle, which can be applied to future development of dump boxes.

Simulations on virtual prototypes of a dump box for a new vehicle helped in aiding with several design decisions.