Suprock Foundation

An easy-to-use software tool for estimating the bearing capacity of surface foundations on rock masses.

Contact information

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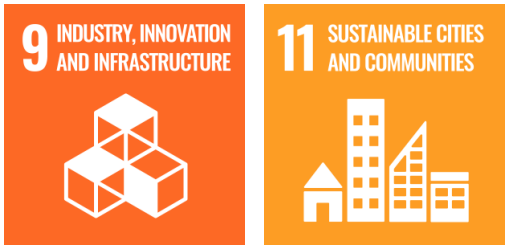
Technological Offers type

Technological solutions

Research and innovation areas

- Industry, Materials and Circular Economy
- Science For Engineering and Architecture

ODS



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Where?

Computational Mechanics Group

Keywords: | foundation

Brief description of the technology solution and the added value it provides

SUPROCK FOUNDATION is a software tool for the calculation of the ultimate bearing capacity of surface foundations over rock masses. SUPROCK is based on

some analytical solutions that include the most widely accepted failure criteria for rock masses.

SUPROCK FOUNDATION is a quick and simple-to-use analysis tool that facilitates reliability and risk assessment . Among its possible applications, building and transport infrastructures (bridges, vertical breakwaters, etc.) or other civil engineering infrastructures (dams, reservoirs, windmills, etc.) are found. SUPROCK helps to quickly decide through different stages of a construction project and to assess the risk in high-uncertain rock masses. Furthermore it reduces the costs of qualified personnel, the cost of the license (in comparison to general purpose softwares) as well as the design time.

Description of the technological base

This tool allows to predict the theoretical maximum pressure between a surface foundation and a rock that does not produce shear failure in the rock mass. It also gives the allowable bearing capacity.

This is done by means of an analytical model of general shear failure that has been particularly set up for the most common problems in civil engineering and architecture. The tool uses one of the most widely used failure criterion or rock mass (the generalized Hoek & Brown failure criterion), which considers not only the features of the rock mass but also its real situation.

A very low computational cost gives the opportunity to simulate different scenarios and perform sensitivity analysis. Under the framework of reliability theories this tool gives the factor of safety, something particularly interesting due to the common uncertainty of input parameters in rock masses.

"This is an easy-to-use, robust and quick tool for geotechnical design and reliability analysis in the context of surface foundations in rock masses"

Market demands

- Many transport infrastructures and buildings are founded on rock masses. The design of their foundations requires tools that allow for the decision-making process along all the stages of a construction project.
- Furthermore, there is a lack of specific rules regulating the foundations on rock masses. Rough approximations to equivalent soils or the use failure criteria exclusively based on the features of the bulk rock is unsatisfactory and increases the uncertainty of the solution.
- The use of general purpose numerical methods requires an adaptation to the specific problem to solve, something that can only be done, in general, after a long time of pre- and post-processing, by highly skilled workers. In consequence, just a few scenery are usually analyzed, thus sensitivity or reliability analysis are not possible. And the solution is potentially more susceptible to operating errors

"SUPROCK performs probabilistic calculations to assess the reliability of the solutions that help for the decision-making process in situations of high uncertainty"

Competitive advantages

- Geotechnics-specific software for foundations over rock mass.
- Easy-to-use.
- Very low computational cost.
- Reduced error sources in preprocessing and post-processing tasks.
- Capability for sensitivity analysis and probabilistic estimation of the factor of safety.
- Support for decision-making in rethinking solutions when issues arise.
- Useful and quick tool through all stages of the construction, for several kinds of users. Useful for the administration and operators or managers, engineering offices, consultors and promoters during the first steps of a project elaboration or during the study of alternatives. It can also be very useful to engineering offices and contractors during the building. In particular it may help to reconsider the design of the infrastructure or building if unexpected issues arise during the construction

Development stage

- Concept
- Research
- Lab prototype
- Industrial prototype
- **Production**

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