Rocket Software

State-of-the-art rock socketed piling design

The requirements of modern construction impose increasing demands on engineers to provide more efficient foundations. Higher loads are sought, at lower cost, and with a level of safety that can be demonstrated to be in conformance with community standards. Rock socketed piles (also known as drilled shafts or drilled piers) are a cost-effective solution in many parts of the world, especially for foundations which carry large column loads. ROCKET is a unique program for the design of rock sockets.

Many methods have been proposed for design of rock sockets based on empirical correlations with pile load test data. However, these correlations are typically based on a best-fit curve to a set of results which may have an order of magnitude scatter. The reason for the wide scatter is that these correlations are usually based on unconfined rock strength alone. Some correlations also include socket roughness, but this is insufficient by itself.

World-leading research at Monash University has established that the following parameters all influence the available socket resistance: the intact shear strength of the rock; the residual friction angle; the mass modulus and Poisson's ratio of the surrounding rock mass; the hydrostatic pressure of the wet concrete; the diameter of the socket and the roughness of the socket wall. All these parameters are incorporated into the program ROCKET, which performs a micro-mechanical simulation of the pile-rock interface under shear. The result is a theoretical prediction of the load-deflection (t-z) response of the interface, and a pile-top load movement response for the complete pile, incorporating elastic deflections of the pile and rock mass.

The program can be used to model piles socketed through as many as 15 individual rock layers. Base resistance can also be taken into account, including the possibility of modelling a layer of soft base debris, and limiting the maximum base resistance. Input is through user-friendly dialogue boxes, for which substantial on-line help is available. Computations can be done in either SI or US units, with conversions between units possible 'on the fly' during analysis.One of the greatest advantages of a ROCKET design, is the designers ability to use the program to evaluate the influence of the full range of relevant parameters. This allows designs to be rapidly refined, to an extent not possible with traditional empirical methods. Rocket can also be used to extrapolate the results of pile load tests to other piles on the site of different diameter or socket roughness, or in rock of different strength or modulus. Graphical Output of Report Standard Final output is available in graphical and numerical form. Apart from individual layer t-z responses, the primary output is a pile-top load deflection prediction which includes elastic deflections of the concrete shaft, as well as elastic movements of the rock surrounding the socket.

The benefits of ROCKET as an advanced rock socket design tool are being utilized by consultants, contractors and government agencies around the world.

For further information, licence purchase enquiries or general project advice please contact Melanie McKie.