VERTICAL VS. INCLINED TESTING OF FALLING ROCK PROTECTION SYSTEMS

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falling rock protection kit, approval testing, laboratory scale

Since the ETAG 027 provides two different test arrangements for approval testing of falling rock protection kits, the question occurred if both methods show the same results concerning a kit´s reaction on a standardized energy impact.

To answer this question the two test arrangements were transmitted to laboratory scale and a commercial falling rock protection kit was modelled relating to the defined scale factors.

For this purpose in a first step, the deformation characteristics of the kit´s main single components were determined and converted to model scale. To receive additional data for model calibration, in a second step, the modelled kit was subjected to several MEL-tests while the stiffness of the used interception structure was adapted until an adequate similarity to the real scale test results was achieved. Vertical testing did this.
For the comparative test series, the inclined test arrangement was defined by a reference slope angle of 30°. This equals the conditions of the Austrian test site at the Styrian Erzberg, where the real scale tests of the modelled kit had been performed.

After model calibration, four tests of two impacts each were performed on both test arrangements. In this process, the first impacts accorded with the maximum energy level. They were placed in the centre module of the kit, but at different positions inside the module. The second impacts accorded with the service energy level and hit the kit always in the centre of the right outer module. Overall, 16 energy impacts were realised in laboratory scale to compare the system´s reaction using different test arrangements.

Even though the objective of the tests was the comparison of two different test arrangements based on the approval-criteria of ETAG 027, the test series delivered further information about the system´s behaviour due to non-standardized impact positions and the possibility of multiple impacts by lab-scale testing.