Second Reply to R. Altindag

‘Brittleness and drillability’

in the Journal of SAIMM, vol 103, no. 8, pp. 525

by H.G. Denkhaus

Please allow me the temerity to reply to your reply to my contribution as follows:

A fracture is brittle if plastic deformation is absent or, conversely, a fracture is ductile if plastic deformation is present. Consequently, brittleness is specified by the degree of plastic deformation at fracture. This is the generally accepted definition.

If other material properties (e.g. the quotient or the product of the uniaxial compressive and tensile strengths) under certain conditions are influenced by brittleness, or brittleness by them, these should not be called brittleness. If the one or the other author does that, he simply uses imprecise language. Even your remark, that ‘Inyang and Pitt (1990) stated that the ratio of the compressive strength $\sigma_c$ cannot be sm less than a certain value $\sigma_t$ for that matter’ is given to limit the area. Otherwise the region under the straight line would of course be infinitely large.

In the sketch below I have tried to illustrate the above comments. I think you had in mind that the area would lead to some concept which would give the product $\sigma_c/\sigma_t$ some physical meaning such as, for instance, the area under the curve of stress over strain is a measure for the specific strain energy. In the case under discussion, however, one can only state:

- The ratio of uniaxial compressive to tensile strength is the ratio of uniaxial compressive to tensile strength and nothing else. Full stop.
- The product of uniaxial compressive and tensile strength is the product of uniaxial compressive and tensile strength and nothing else. Full stop.

I did not query the validity of some relationship between $\sigma_c/\sigma_t$ or $\sigma_c/\sigma_t$ and brittleness but I consider it of academic interest only and doubt its practicability compared with the Schmidt hammer test. Taking rock specimens and determining their strength is cumbersome and costly. In particular, determining the tensile strength of rock is difficult. What method is to be used—the so called Brazilian test or interest only and doubt its practicability compared with the Schmidt hammer test. Taking rock specimens and determining their strength is cumbersome and costly. In particular, determining the tensile strength of rock is difficult. What method is to be used—the so called Brazilian test or rock oscillation and drillability but I consider it of academic interest only and doubt its practicability compared with the Schmidt hammer test. Taking rock specimens and determining their strength is cumbersome and costly. In particular, determining the tensile strength of rock is difficult. What method is to be used—the so called Brazilian test or testing with carefully machined standardized tensile specimens?

I trust that you find these remarks valuable.

H.G. Denkhaus

© The South African Institute of Mining and Metallurgy, 2003. SA ISSN 0038-223X/3.00 + 0.00

The Journal of The South African Institute of Mining and Metallurgy

MARCH 2003

527