Correlation of ultrasonic echo amplitude of lack of penetration with probe angle

T M R Tennakoon*[1] and N Munasinghe[2],

[1] *Atomic Energy Authority, 60/460, Baseline Road, Orugodawatta, Wellampitiya.*

[2] *Department of Materials Engineering, Faculty of Engineering, University of Moratuwa, Katubedda.*

In conventional ultrasonic flaw diagnosis techniques to identify lack of penetration, which is a common defect, occurs in single V-butt welded plates flaw position and flaw pattern from the CRT screen of the detector are used. A major drawback of this technique is that only well-experienced operators can identify flaw type using echo pattern since false and non-relevant indications from the weld root may disturb the actual flaw pattern.

To avoid the above-mentioned drawbacks a new way to identify lack of penetration of a single-V butt-welded plate is suggested. Theoretically it can be shown that the ultrasonic energy reflected from a right-angled corner of a steel specimen is 100%, 13% and 50% of initial sound pressure for probes 45^0,60^0 and 70^0 respectively. In this work, this relationship was applied for lack of penetration of a single-V butt-welded steel plate and attempts have been made to develop a relationship between probe angle and respective echo amplitude.

From the results, it can be concluded that for a lack of penetration of single-V butt-welded plates having 15 mm thickness the echo heights are (100.0±0.0)%, (29.8±2.4)% and (65.0± 7.3)% for probe angles 46°, 61° and 73° respectively. This relationship can be used to distinguish lack of penetration of single-V butt-welded plates from other type of defects, false or non-relevant indications. The draw back of this method is that the operator must be very careful in obtaining highest flaw echo amplitude. This work will be continued to investigate the correlation between probe angle and flaw echo amplitude for other types of defects like cracks, porosity etc.

*srlaea@slt.lk Tel: 011 2533427-8