Appendix II.2

Recommended Procedure for
Measurement of case depth in carbunized
And hardened carbon steel balls

B2.1   Scope. This procedure is used to measure the effective case depth of carbunized and hardened carbon steel balls. Effective case depth is defined as the depth radially below the finished ball surface where microhardness tests show the hardness equivalent of Rc 50.

B2.2   General description. The practical method of measuring effective case depth is by means of microscopic examination of a polished and etched sample of balls prepared in a suitable plastic mount. The depth is read to the transition point between the case and core where the effective case depth corresponds to the hardness equivalent of Rc 50. The microhardness test is used only in referee cases and consists in plotting hardness values taken radially at 0.125mm (0,005") increments on a suitable graph, from which the depth is read by the microscopic method using an X20 binocular microscopic fitted with a calibrated scale in the eye-piece. Higher magnifications may be used if it is necessary to more clearly define the transition zone,

2.3   Test procedure

B2.3.1
    a)   Mount balls in a suitable plastic material and grind them to one-half their diameter.

    b)   Polish for microstructure examination and etch the specimen using 2% nital etch solution and rinse thoroughly after etch with alcohol.

    c)   Read the case depth on each ball. Case depth is measured using a calibrated eye-piece, employing binocular microscope of 20X power. The case depth is measured radially and includes all the transition zone from the case up to the core. Greater magnification is acceptable if it is necessary to more clearly define the transition zone.

    d)   The readings are then recorded.

    e)   The range in effective case depth in any lot of balls is the difference in the maximum and minimum readings observed on the entire sample inspected.

B2.3.2 Microhardness   Examination----for referee determination of case depth and range of case depth within a lot.
    a)   Use the same mounted balls that were used for the microstrcture examination.

    b)   Select two (2) balls that have the minimum and maximum visual case depth.

    c)   Make microhardness readings on a radial traverse of the ball at 0,125mm (0,005") intervals starting at the transition zone nearest to the outside of   the ball and continuing toward the center until at least two readings are taken that are approximately the same.

    d)   These raedings are plotted on a suitable plot sheet

    e)   The effective case depth is the reading at which the line reaches Rc 50.

f)   The range in effective case depth in any lot of balls is the difference in case depth ba microhardness readings observed in the two (2) balls that had the minimum and maximum visual case depth.

g)   Minimum case depth values are as shown in table B