

Computerised control and data acquisition for corrosion experiments

R. KULGOD, R. KUMAR, K. B. GAONKAR and P. R. SINGH*

Electronic Services Division, BARC, Mumbai 400085

**Metallurgy Division, BARC, Mumbai - 400085.*

ABSTRACT

Electrochemical measurement of corrosion involves imposition of electrical perturbation in the form of potential or current on the test specimen and measuring its response. A potentiostat is most frequently used for this purpose. The present paper describes a menu driven user friendly software developed for corrosion analysis by interfacing the potentiostat with PC-AT. The system was developed around a laboratory developed potentiostat and a PC/AT 486. The interface between the two was developed using a PC plug in PCL 208A card with nominal specifications : AD 16 ch., DA 2ch, res 12 bits, max. frequency 100 KHz. The DA channels were modified for bipolar output and fine tuning of potential. Corrosion rates are measured by (i) linear polarisation, (ii) Tafel analysis and (iii) increasing pulse polarisation. The corrosion rate is calculated using Stern Greary equation with R_p measured from the polarisation data and known tafel slopes. Alternatively it is calculated using a nonlinear least square algorithm. Besides corrosion measurement the system is also used for other experiments like potentiodynamic polarisation, pitting, cyclic voltametry, EPR and transients. The specifications for the present system are : control potential range $\pm 2V$, resolution 0.488 mV, current sensitivity 0.1 μA , scan rate 0.26 $\mu V/sec$ to 20 V/sec , pulse potential 1.2 mV to 5V, pulse time 250 ms. to 72 mins. Completely arbitrary waveform can be generated and imposed on specimens. The software has facility for preview of potential waveform, simultaneous display of acquired potential/current data, drawing of lines and tangents, data viewing and editing and calculation of different corrosion and electrochemical parameters. □