16.3.3 IMAGE PROCESSING OF DIFFRACTION PATTERNS INVOLVING SHARP AND/OR DIFFUSE SCATTERING. By H.J. Millett, J. Henderson and P.A. Woods, Crystallography Unit, Department of Geological Sciences, University College London, Gower Street, London WC1E 6BT, U.K.

TV images of diffraction maxima may be obtained either in real time, using a low-light TV camera and a suitable fluorescent screen, or by accumulating a number of frames (say 50) in a frame store, in which case a less noisy image is obtained. (Mildege H.J., Read A.P., Nave E. & Woods P.A. IUCr.Xt (Warsaw) 14,1-2) These images approach the clarity of that obtainable on X-ray films, from which computer-controlled densitometry now enables high-quality intensity data to be obtained provided that suitable software is available to process the raw data.

Such raw data consists of grey-level values for contiguous areas of, say, 50 x 50 pixels, which is exactly analogous to information contained in the individual pixels handled by image processing systems, for which increasing amounts of sophisticated software are becoming available.

This paper briefly describes this system and our experiences to date, and looks at the likely impact that this product will have on the powder diffraction community.

16.5.2 HIGH RESOLUTION X-RAY POWDER DIFFRACTOMETER. By M. Anten and P. Scudder, Department of Physics, University of Helsinki, Finland.

A high resolution version of a conventional Bragg-Brentano diffractometer is built. The take-off angle of radiation is 3°, so that the projected width of the source is 50 μm. A quartz (0.1) primary beam monochromator of the Johansson type is used for CuKα radiation; the cusp of the focusing circle is 155 mm. A narrow slit (20 μm) is placed at the focus of the monochromator. The aperture before the sample is 1 x 6 mm (rectangular) and 1 x 25 mm (axial). The sample is spun about the surface normal. The receiving slit is 0.1 mm or 0.3 mm (0.6 mm or 0.3 mm wide in most experiments, and the axial divergence of the diffracted beam is 66 mm. Beam tunnels are used between the monochromator and the sample as well as between the sample and the receiving slit. An automata detector with a pulse height discriminator is used, and the measurement is controlled by a microcomputer. High angle reflections show no trace of the CuKα component. The resolution, as measured from an annealed Al sample, is 0.07° (FWHM) at 20 = 42°, 0.09° at 76°, 0.09° at 93°, and 0.21° at 145°. The values measured from the same sample with a synchrotron radiation instrument are 0.04° at 42° and 0.09° at 76°. The background is mostly due to the detector noise and inelastic scattering from the sample. The peak of the strongest reflection with the 0.05 mm slit is 240 cps and the background less than 0.5 cps, when the tube rating is 25 kV and 14 mA. The performance of the instrument was tested with good results by a measurement on the room-temperature phase of NaClO₃, where the average density of reflections is 3 per 1 degree of 2θ.

The intensity is increased by a factor of 5 when the X-ray tube is replaced by an 1.5 kW tube, where the projected width of the source is only 75 μm.