enough to fall through the slag during reduction experiments. After separation of the metal drop from the surface, the metal later produced at the surface is enriched in iron.

Fig. 2 shows the top region of a tin slag with a low-iron content after gaseous reduction. A very high concentration of prills can be seen at the surface, whereas the bulk of the slag is free of metal prills. There were several drops of metal at the base of the crucible which had not coalesced to form a button. The metal at the top and bottom of the slag possessed about the same iron content (2 per cent). This experiment indicated that the separation of tin metal with a low-iron content from slag was quite difficult, possibly owing to the low surface tension of such alloys.

The reduction of tin slags by gaseous reduction was discussed in relation to the smelting of low-grade tin concentrates by Floyd and Thurlby.[4] In smelting operations the flotation of metal prills is undesirable, either because it leads to increased loss of tin in slag or because it lowers the yield of crude tin metal for a given quantity of gas injected because of reoxidation of metal at the surface. Reduction to produce a metal of high-iron content resulted in very little flotation; thus, in smelting concentrates with significant iron contents the effect of flotation is likely to be more important in decreasing the yield of crude metal in the early stages of reduction when the metal produced has a low-iron content. The final tin content of slags was not limited by the presence of metal at the surface but by the formation of solid tin–iron alloy in the form of a honeycomb-like structure mixed with slag. This occurred at tin levels well below 1 per cent Sn in the cases studied. To avoid reoxidation of metal at the surface the furnace atmosphere should be maintained reducing. In continuous operations the tapping of slag from well below the top surface would be advantageous in avoiding carryover of a metal-enriched surface region.

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Choice of jig stroke length and frequency in relation to concentrate flow

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In an earlier paper a quantity called the intensity of stroke, having the dimensions of a velocity, was shown to be positively related to the percentage of feed reporting at the spigot of a jig.[1] The intensity of stroke was defined as the volume displaced by the jig diaphragm through the jig bed in cubic feet per minute per square foot of jig bed area.

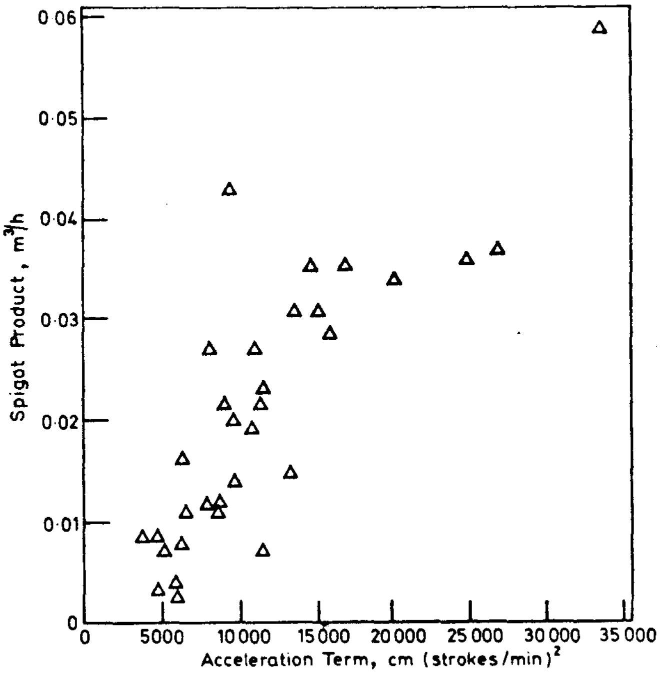

Fig. 1 Spigot Product versus Acceleration Term: laboratory Hartz jig–stroke length, 2·03–32·26 mm (0·08–1·27 in), frequency, 50–257 strokes/min; constant make-up water

The flow of concentrate through a jig spigot can also be described in terms of the maximum acceleration of the jig diaphragm. In an earlier analysis[2] at constant feed rate the percentage of the jig feed reporting at the spigot was plotted against the acceleration factor LS^2, where L is the stroke length and S the number of stroke cycles per minute (Fig. 1). High recovery corresponds to high acceleration. It is of interest to explore the usefulness of this type of analysis for variable feed rates.

The percentage of the feed reporting at the spigot varies inversely as the feed rate.[3] The actual spigot flow rate is practically independent of feed rate, as is illustrated in Fig. 2, which is based on data from Batzer.[3] The acceleration term may, therefore, be plotted against spigot product flow rate for tests with differing feed rates, provided that other variables, such as make-up water, ragging voids and feed grain-size distribution, have comparable values. Results from 21 tests which fulfilled this condition[3] were used to produce Fig. 3. These tests were carried out at 130 strokes/min, except