

13: Simple jigs – 1960s-1970s research in China

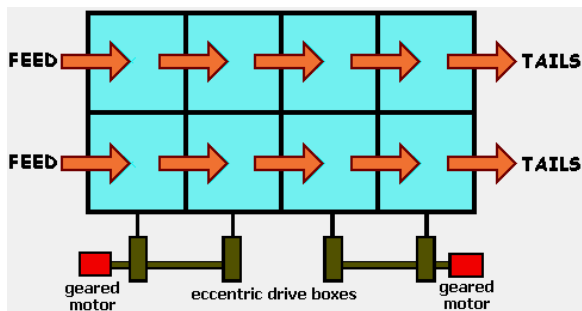


Figure 31. SIMPLE JIGS
Overhead view of a conventional 2x4 cell rectangular jig. (drawing: Robin Grayson, adapted from Nio 1978 [55])

A simple jig consists of a square jig cell comprised of a lower water-filled chamber (hutch) covered by a jig screen above which slurry is introduced. Resting on the jig screen are large heavy particles (e.g. steel balls) that constitute the jig bed.

Small square jigs are often arranged in series (to increase recovery) or in parallel (to increase capacity).

A simple square jig is typical of most jigs in exhibiting a mix of continuous discharge of fine gold and batch discharge of coarse gold.

Although easy to build and simple to operate, simple square jigs are unsuitable for efficient placer gold mining:

- ✘ the jig's footprint is large, demanding too much space on dredges where space is a premium, and too bulky to easily make into a mobile land-based processing unit;
- ✘ water consumption is high to very high – a serious problem for land-based units if water is scarce and demanding large tailings ponds for water storage and recirculation; and
- ✘ high % recovery of fine gold recovery is difficult to achieve.

In China in the 1960s-70s experiments by placer scientists of the Minerals Processing Laboratory of the Kunming Institute of Metallurgy in Yunnan Province determined the percentage gold recovery of simple jigs [27]. Gold recovery falters at 0.8mm, is only 90% by 0.3mm, and collapses to 50% at 0.1mm.

Operation

The pay gravel is first disaggregated, size-sorted and oversize rejected in a screening plant.

The slurry feed passes across the jig bed that rests on the jig screen. At the same time, water erupts through the holes in the jig screen from the hutch below.

The water is pushed up by some means, usually a rubber diaphragm inserted in the hutch as a pulsator – pushing up (upstroke) and sucking down (downstroke). The drive is significant, either hydraulic or mechanical.

On the upstroke, the erupting water intermingles with the jig bed, and causes all of the jig bed to be 'jigged' – the steel balls may slightly rise and fall, but the layer of smaller particles on or near the jig bed are pushed upwards – allowing Stokes Law to operate. The smaller particles become sufficiently agitated to become a fluidised bed like quicksand – the thixotropic state. The loosened heavies fall rapidly to burrow into the protective jig bed, while lights are swept away as tailings.

On the downstroke, water is pulled downwards by suction, and the upper part of the jig bed becomes a hard layer – the dilatant state. The suction plus gravity pulls dense particles down to the bottom of the jig bed where coarse gold and gold nuggets accumulate as 'jig bed concentrate' awaiting cleanout during batch discharge. Finer gold is flushed through the jig screen into the bottom of the hutch to be tapped off the bottom as 'hutch concentrate' continuously discharged via a spigot.

Adoption by placer gold miners

Simple square jigs used to be fairly popular in placer gold mining, particularly in wash-plants on-board dredges, but have virtually disappeared with the advent of more modern jigs, although a few are seen in remote mines and are occasionally used for upgrading concentrates.

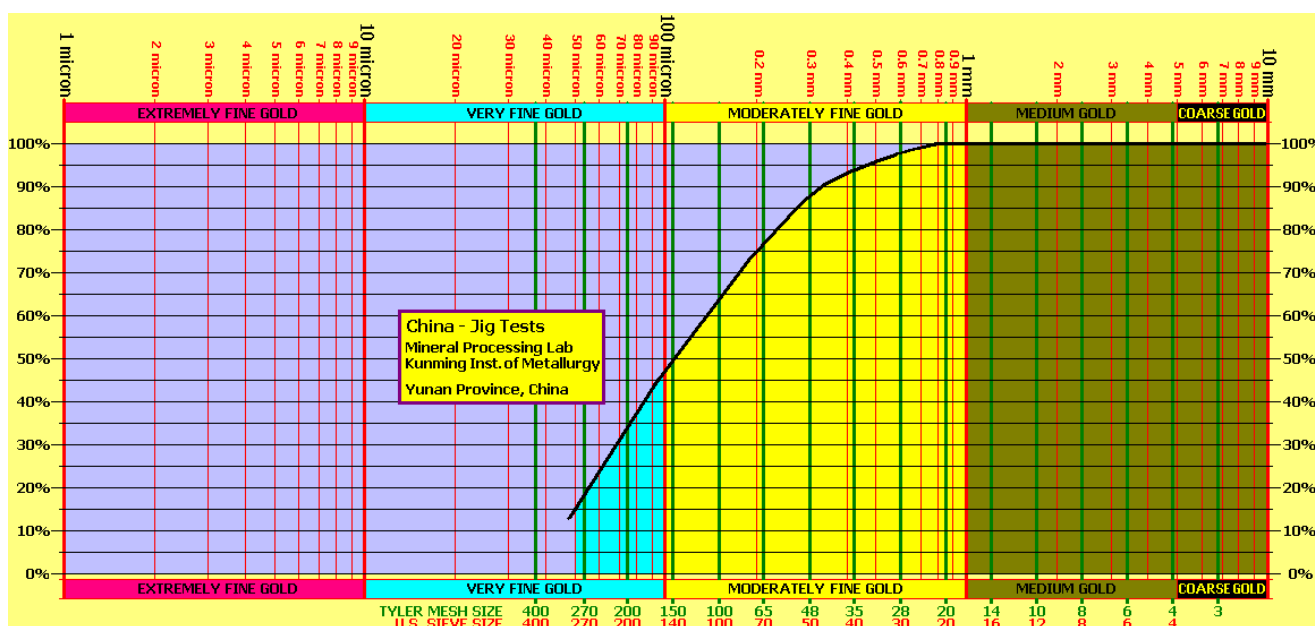


Figure 32. GOLD RECOVERY BY SIMPLE JIGS – China tests
Poor performance of simple jigs [3, 27]. (compiler: Robin Grayson)