

THE KELSEY CENTRIFUGAL JIG - A NEW DIMENSION TO GOLD PROCESSING

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Abstract - Gravity concentration methods have for a long time been an integral part of gold processing due to their operational simplicity and higher capacities to that of other methods. With the environmental issues involved in cyanide processing and increasing energy costs associated with low agitation times, focus has again turned to maximising gravity concentration.

However, in most cases, the traditional gravity concentrators (jigs, spirals) lose efficiency when the mean particle size is lower than 100 μ m and high grade targets are to be maintained.

Geo Logics Pty Ltd has recognised the need to economically separate at high grade minus 150 μ m gold particles from gangue. This has led to the development and manufacturing of the Model J1800 Kelsey Centrifugal Jig.

This paper presents the operation of the Model J1800 Kelsey Centrifugal Jig in on-site testing and other data.

Introduction

The Kelsey Centrifugal Jig is in plant operations all over the world separating various minerals at high efficiencies down to very fine sizes with specific gravity differences as close as one. Past tonnage limitations have limited its application to higher valued concentrates.

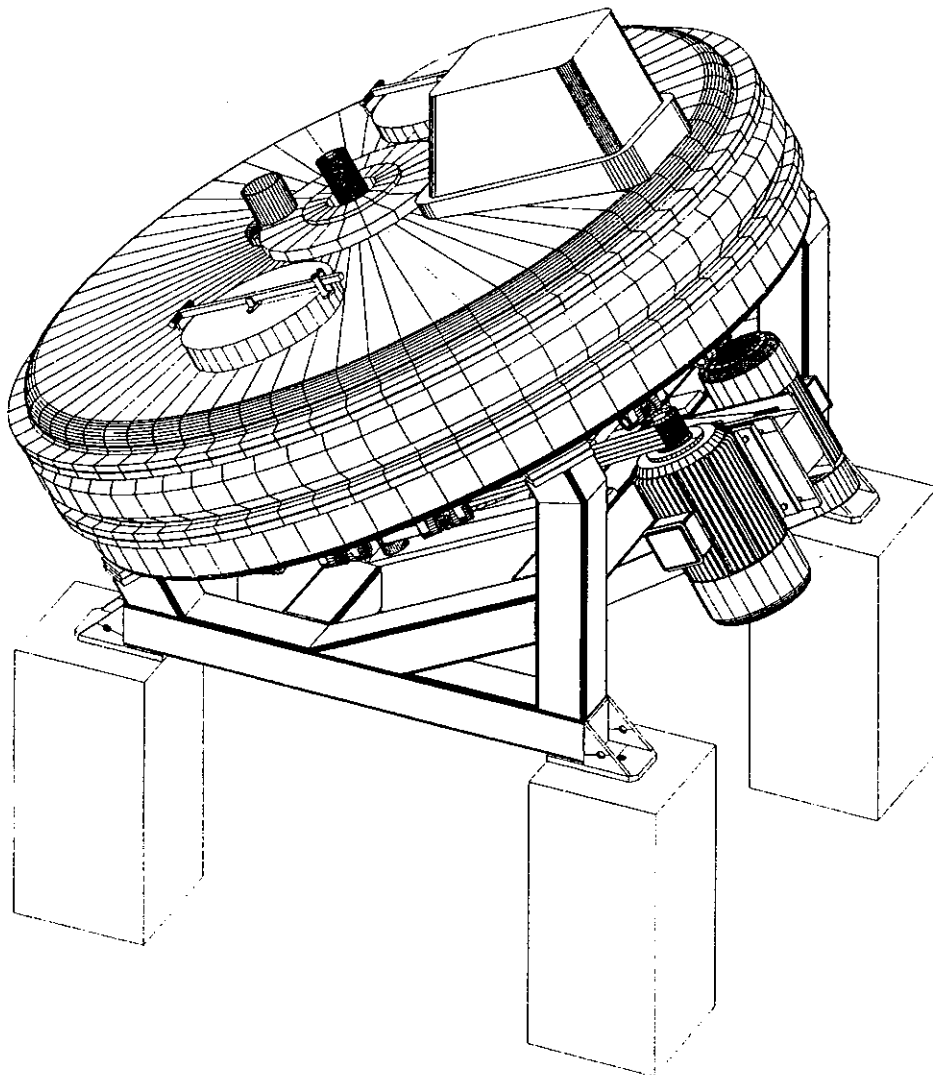
The vast increase in production unit size has seen throughput increase to 100mtph from 30mtph.

The internal screen cleaning is now completely automatic.

Model J1800 Kelsey Centrifugal Jig Description

The Kelsey Model J1800 unit is substantially larger than the existing units. The size change was aimed at handling a vast increase in tonnage and yet maintaining the high metallurgical performance for which the Kelsey Jig is renowned.

Below is a three dimensional picture of the Model J1800. It can be clearly seen the minor floor space and height requirements needed to install one of these units.



Slight changes have been implemented to the working components of the device to ensure minimal downtime is maintained and that operator involvement is at the absolute minimum.

The changes include an automatic screen cleaner which improves availability and gives consistent cleaning and optimal metallurgical performance.

Other changes include inclining the device to minimise the footprint and heavier launders to minimise potential operating harmonics due to plant construction.

Case Study

Many papers have been written over the years by plants operating or evaluating the Kelsey Centrifugal Jig and the metallurgical results have always been very impressive. The commercial release of the new series of Kelsey Jigs has now made the device much more amenable to processing high tonnage streams economically.

A recent trial was conducted at a gold operation, in which the aim was to recover at high tonnage the gold bearing sulphides in the processing plant tailings stream. Numerous feed rates were tested to identify the optimum throughput for the application.

Table 1 - Tonnage Comparison of Model J1800

Feed mTPH	Kelsey Jig Concentrate		
	Wt %	S %	Rec. %
42	22.0	5.09	61.8
50	4.14	9.2	56.9
65	5.35	8.4	51.7
83	8.32	7.9	47.2
100	8.54	10.4	54.8

For many years it has been acknowledged that scalping coarse gold from the primary grinding circuit can have positive down stream effects for leaching kinetics, overall recovery and cost of gold production.

Until recently this was achieved by treating a portion of the cyclone underflow stream and relying on the high recirculation of some coarse gold to achieve even at best a 30-40% recovery.

Many problems arise, however, when trying to treat cyclone underflow such as;
Almost treating the same tonnage as fresh feed due to high recirculating loads
Trash screens are essential for any concentrator to work properly
Water balancing can be an issue
Collection and transportation of concentrate
Damage by scats to equipment
Extensive leaching time required for concentrates

With the development of the Model J1800 Kelsey Centrifugal Jig, a substantially higher tonnage unit than the Model J1300, successful treatment of primary cyclone overflow (leach feed) is now possible.

There are many positive aspects which arise when treating the leach feed such as;
 Many existing plants already have trash screens on the leach feed material to ensure no organic material enters the leaching circuit;
 No scats
 No issues with water balancing
 The whole stream is processed
 Much finer material
 Fast leach kinetics of concentrates

The Kelsey Centrifugal Jig has been tested at full scale and has yielded very promising results.

Table 2 -- Cyclone O/F Results of Model J1800

Feed mTPH	Kelsey Jig Concentrate		
	Wt %	Au Rec. %	S. Rec. %
45	10	86	56

The Kelsey Centrifugal Jig at a smaller scale has been tested on various cyclone overflow streams and has to date yielded recoveries of 80% with only a 2-3% weight yield. High intensity cyanidation of the concentrate was fast due to the size of the particles.

Mechanical reliability was as expected, excellent. The advancements made by the Geo Logics engineering staff have ensured a low operator involvement machine.

Other Metallurgical Data

A series of Kelsey Centrifugal Jig tests were conducted on samples from a number of areas within the Alaskan Gulf. Mineralogically, the gold was described as fine, smooth, clean, flat flakes up to 500 microns in diameter but less than 20 microns in thickness. Feed grades ranged from 0.04 - 4.00 g/t Au and recoveries varied from 73 - 97 % with upgrading ratios of 26 - 150. A summary of data is shown in Table 3 and typical sizing data of the Kelsey Centrifugal Jig concentrate is shown in Table 4.

Table 3. Summary of Data

Sample	Feed g/t Au	Conc. g/t Au	Tail g/t Au	Recovery % Au
Location A	1.04	37.2	0.07	93.4
Location A	0.68	11.7	0.07	90.2
Location B	4.00	61.6	0.08	98.6
Location C	0.08	2.09	0.01	88.0
	0.38	12.6	0.01	97.4
	0.54	84.4	0.01	95.5

Table 4. Typical Sizing Data of the Kelsey Centrifugal Jig Concentrate

Size Fraction µm	Distribution Au %
+75-300	63
+38-75	21
-38	16

Acknowledgements

Geo Logics would like to thank all the mining companies involved in aiding the comprehensive testing of the Model J1800 Kelsey Jig and aiding in its acceptance into the mining industry.

Conclusions

The introduction of the Model J1800 Kelsey Centrifugal Jig will ensure the predominant use of this type of equipment in the gold industry for many years to come. The ability of this equipment to generate high grade concentrates in a single pass will ensure the most simple and efficient flow sheet in the gold processing industry.

References

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