

COMPUTER PRESENTATION IN MINERAL PROCESSING BY SOFTWARE COMUPUTER PACKETS

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ABSTRACT

In this paper will be shown computer application of softwares Minteh-1, Minteh-2 and Minteh-3 in Visual Basic, Visual Studio for presentation of two-products for some closed circuits of grinding-classifying processes.

These methods make possibilities for appropriate, fast and sure presentation of some complex circuits in the mineral processing technologies.

1. INTRODUCTION

Information about any mineral processing, for example efficiency or the values of parameters in the models of the processing units in the circuits, requires information about the flow rates and compositions of the streams entering and leaving the circuits. A lot of circuits flow measurements are made on feed and products streams and occasionally one or more of the internal streams.

Flow rates of the remaining streams are calculated by computer software packets or from other measured characteristics. Investigation of circuit efficiency using different techniques involves calculation of complete circuit material balances from incomplete raw plant data, calculation of model parameters from the completed set of plant data or circuit simulation on a digital computer followed by optimization studies.

Although of great use, the two-product formula does have limitations in plant accounting and control. The equations assume steady-state conditions, the fundamental assumption being that input is equal to output.

1.1. Introduction to Mass Balances on Complex Circuits

Some computer programmes in mineral processing technology which have represented two-product formula are known. Some of them are for sensitivity of the recovery equation, sensitivity of the mass equation, for maximizing the accuracy of computations.

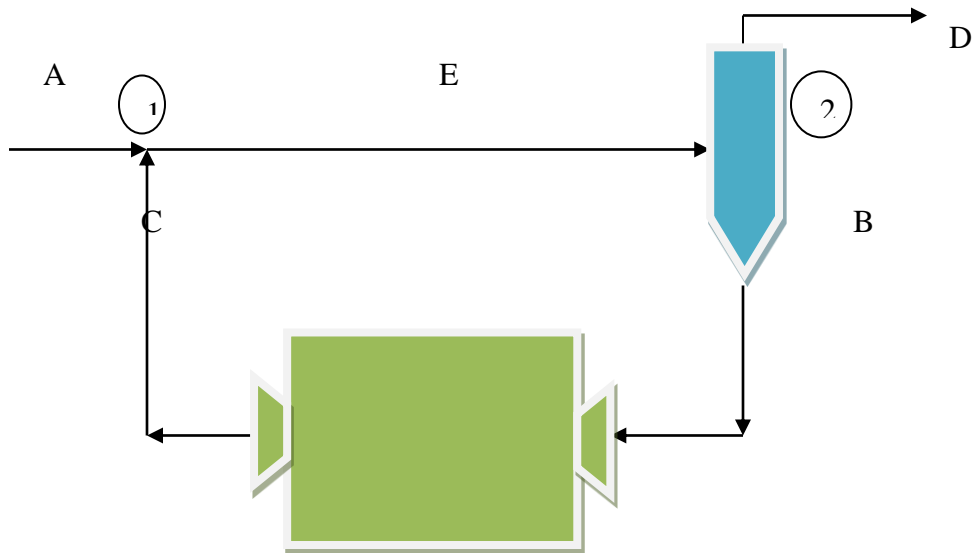
By the way, some computer programmes have used another more complex mathematical methods involving connection-matrix or reconciliation of excess data "curve-fitting" etc.

1.2.The model of connection – matrix

The mathematical simulation may be defined as influences between E (efficiency of classifying), C (circulating load) and a, b are the percentage weights in any specific size fraction in the mill product. Using the connection-matrix or matrix algebra the little changes in the particle sizes are following:

$$E = \frac{c \cdot (a - b)}{a \cdot (a - b)} \cdot 100$$

$$C = \frac{c - a}{a - b} \cdot 100$$
(62)



$$f = \begin{pmatrix} f_1 \\ f_2 \\ \vdots \\ f_n \end{pmatrix} = (f_i)$$

$$C = \begin{pmatrix} c_{11} & 0 & 0 & \dots & 0 \\ 0 & c_{22} & 0 & \dots & \\ 0 & 0 & c_{33} & \dots & \\ \vdots & & & \ddots & \vdots \\ 0 & 0 & 0 & \dots & c_{nn} \end{pmatrix} = (c_{ii})$$

$$M = \begin{pmatrix} m_{11} & 0 & 0 & 0 & \dots & 0 \\ m_{21} & m_{22} & 0 & 0 & \dots & 0 \\ m_{31} & m_{32} & m_{33} & 0 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ m_{n1} & m_{n2} & m_{n3} & \dots & \dots & m_{nn} \end{pmatrix} = (m_{ij})$$

1.2.1 Reconciliation of excess data “curve-fitting”

Two basic methods have commonly been adopted, both of which use a least-squares approach, and they can be broadly classified as minimisation of the sum of squares of the residuals in the component closure equations (*Lagrange multipliers*) and minimization of the sum of squares of the component adjustment.

Table 1.

Tyler mesh	Circuit feed	Hydrocyclone			Circuit output
		feed	overflow	underflow	
+8	0.1			nil	
+10	0.4			0.3	
+14	1.0	nil		0.2	nil
+20	1.2	0.4		0.2	0.1
+28	1.6	0.3		0.3	0.1
+35	2.2	0.3		0.6	0.2
+48	2.9	0.9	nil	1.2	0.7
+65	4.7	1.7	0.1	2.1	1.5
+100	8.1	4.7	0.3	5.7	4.9
+150	9.3	8.9	0.8	9.9	9.3
+200	12.8	21.6	2.6	25.4	24.6
+325	14.1	30.9	13.8	33.5	32.0
-325	41.6	30.3	82.4	20.6	26.6

Table 2.

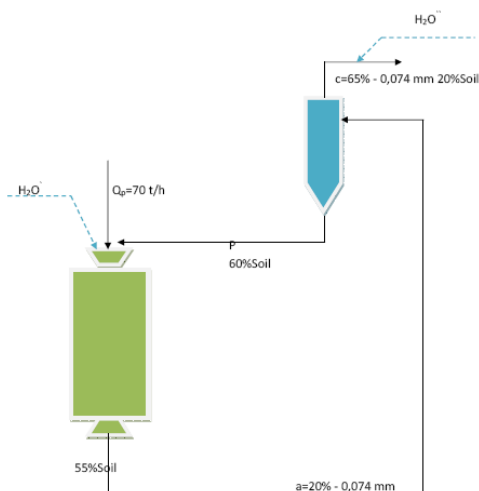
Tyler mesh	Stream residuals $\alpha = 6.0872$		Lagrange multipliers	
	Δ_1	Δ_2	λ_1	λ_2
+8	-0.10	0.0	0.0024	-0.0014
+10	-0.40	-1.53	-0.0114	0.0305
+14	-1.00	-1.02	0.0007	0.0103
+20	0.73	1.42	0.0023	-0.0235
+28	-0.28	0.30	-0.0108	-0.0109
+35	-1.39	-1.23	0.0160	0.0099
+48	-0.98	-0.63	0.0146	0.0013
+65	-1.98	-0.43	0.0408	-0.0168
+100	-4.42	-0.69	0.0947	0.0441
+150	-2.43	3.01	0.0985	-0.1042
+200	-6.46	-0.33	0.1477	-0.0804
+325	11.20	3.87	-0.2110	0.0617
-325	7.52	-2.75	-0.2148	0.1676

Table 3.

Tyler mesh	Circuit feed	Hydrocyclone			Circuit output
		feed	overflow	underflow	
+8	0.1	0.0	0.0	0.0	0.0
+10	0.4	0.1	0.0	0.2	0.1
+14	1.0	0.1	0.0	0.2	0.1
+20	1.2	0.3	0.0	0.3	0.1
+28	1.6	0.3	0.0	0.4	0.1
+35	2.2	0.5	0.0	0.6	0.1
+48	2.9	1.0	0.0	1.2	0.6
+65	4.7	1.9	0.1	2.2	1.3
+100	8.0	5.0	0.4	5.9	4.4
+150	9.2	8.9	0.9	10.4	8.8
+200	12.7	22.0	2.7	25.8	23.9
+325	14.3	30.0	13.7	33.2	33.1
-325	41.8	30.0	82.2	19.8	27.7

1.3 Application of the mineral processing softwares

In this paper will be shown some examples of closed circuits of grinding – classifying applying computer programmes for their solving (MINTEH-2 and MINTEH-3 in Visual Studio 2008).



Minteh

Проблем Решение а) Решение б,в,г

Задробената руда (-5+0) се води на едностадийно мелене во мелница со четири топки со два класификатора, при што мелницата се храни со обата песока од класификаторите. Ако се познати процентуалните состојки на класата -0,15 мм.

а = % ... во сомелениот производ од мелницата.

б1 = % ... во песокот од I класификатор.

б2 = % ... во песокот од II класификатор.

и условот да коланата на песокот од II класификатор е 5 пати поголема од коланата на преливот на I класификатор, која се спојува со коланата на преливот од II класификатор, да се прикаже и пресмета.

а.) - Шематски да се прикаже процесот на мелене.

б.) - Да се пресмета циркулацискиот товар на мелницата.

в.) - Да се пресмета производноста на мелницата.

г.) - Да се пресмета процентуалниот состав на класата -0,150 мм во влезната руда

Qr = t/h

Пресметај

Minteh

Проблем Решение а) Решение б,в,г

б.) Циркулациски товар на мелницата

C = %

в.) Производност на мелницата

P1 = t/h

P2 = t/h

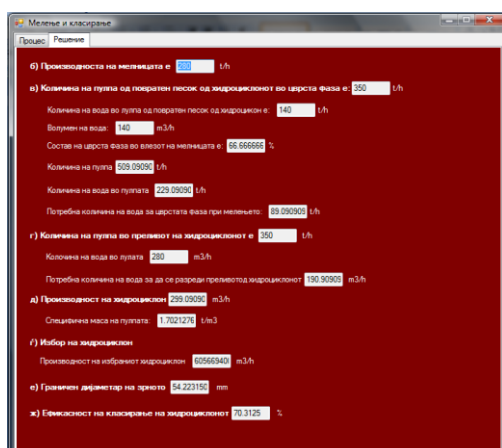
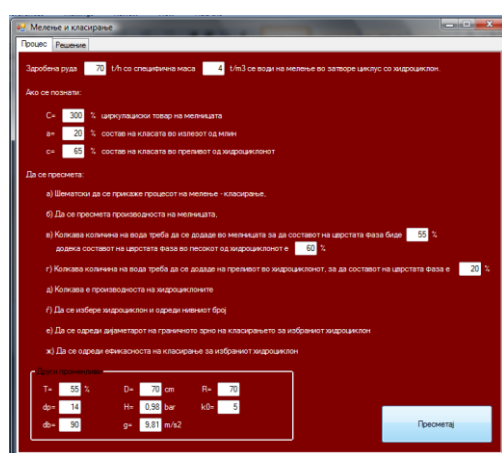
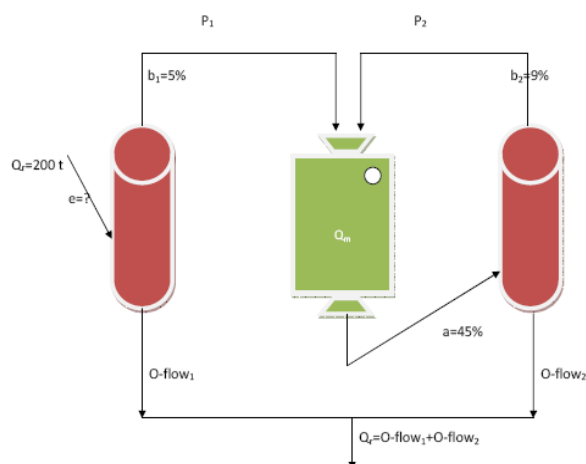
Qm = t/h

г.) Процентуален состав на класата -0,150 мм во влезната руда

P1 = t/h

E = %

method of solving the problems of appropriate solution for different cases or models in mineral processing technology.



CONCLUSION

Application of computer softwares programmes is the strong way for presentation and forecasting of the possible optimal decision of the closed circuits of grinding-classifying operations. This presentation is attempt to represent a simple

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