USE INDEPENDENT PATHWAY TO TROUBLE POLYGONAL TOPOGRAPHY PIRCING MINING

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ABSTRACT: *The article reviews the possibility of using an independent topographic base to achieve mining works which have a thrusting.*

1. THE PURPOSE AND IMPORTANCE OF THE WORK

It can meet the execution of underground (horizontal, vertical, inclined) when it is possible to make a polygonal path necessary and sufficient support for coordination work breakdown.

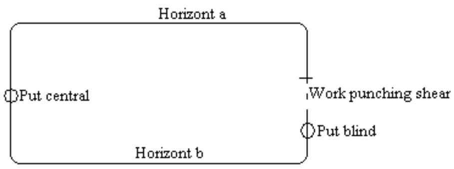

Fig.1

This route forms a topographically independent system (called polygon of breakdown), errors in measuring angles and these sides forming an independent system acting on achieving punching shear of the work. This feature requires a detailed study on the propagation of errors, their influence on achieving punching, distribution errors, etc.

2. THE WORK CONTENT

To prepare the study, separate angles errors errors separate sides settling their influence in polygons punching shear.

2.1. Influence of angular errors

Consider a simple polygon punching shear of 4 sides (fig.2) in which angle β_1 was measured with the error ε_1.

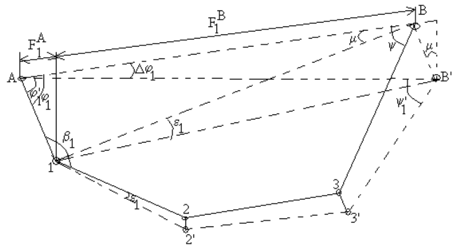

Fig.2

A1 vs. B side will move in B 'and angles φ_1' and Ψ_1' have errors $\Delta\varphi_1$ and $\Delta\Psi_1$ With these notations we can write:

$$\varphi_1 = \varphi_1' + \Delta\varphi_1' \qquad (1)$$
$$\Psi_1 = \Psi_1' + \Delta\Psi_1'$$

The figure shows:

$$\Delta\varphi_1 = \varepsilon \frac{1B\cos\mu}{AB} = \varepsilon_1 \frac{F_1^B}{S} \qquad (2)$$

It is noted:
F_1^B – distance from point B to point projection one side AB
S – distance between points A and B

Analog, error ε_2 of the angle β_2 producing the angle φ error $\Delta\varphi_2$ date the relation:

$$\Delta\varphi_2 = \varepsilon_2 \frac{F_2^B}{S} \qquad (3)$$

Continuing totaling reasoning and relations (1), (2),…. total error is obtained:

$$\Delta\varphi_t = \frac{[\varepsilon F^B]}{S} \qquad (4)$$

Taking as fixed side edge of the angle 3B total error Ψ angle is determined by the errors:

$$\Delta\Psi_t = \frac{[\varepsilon F^A]}{S} \qquad (5)$$

Polygon A, 1, 2, 3, B using the piercing of mine works in the direction AB, provides steering angles φ_t', Ψ_t' inaccurate compared to actual measurements $\Delta\varphi_t$ and $\Delta\Psi_t$ given by relations (3) and (4).

This means that if two lines advancing mining work punching shear after directions AK and BK (fig.3).

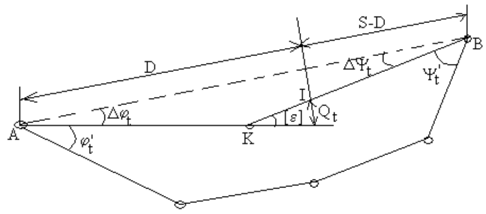

Fig.3

It follows that if K is the point of breakdown, puncture mining of the work is done without a deviation.

We consider the case when rates are advancing so that punching shear point is the point I different from point K.

In this situation, with the notations in Figure 3, the error cross Q_t is given by:

$$Q_t = D\,\Delta\varphi_t - (S - D)\Delta\Psi_t \qquad (6)$$

Or the relations (3) and (4):

$$Q_t = D\,\frac{[\varepsilon F^B]}{S} - (S - D)\,\frac{[\varepsilon F^A]}{S}$$

But:

$$Q_t = D\,\frac{[\varepsilon(S - F^A)]}{S} - (S - D)\,\frac{[\varepsilon F^A]}{S}$$

And

$$Q_t = [\varepsilon(D - F^A)] \qquad (7)$$

Denote by m_β mean squared angular error and then:

$$Q_t = \pm m_\beta\sqrt{[(D - F)^2]} \qquad (8)$$

2.2. Influence of aspect errors

We consider the analysis of representation in the next figure (fig.4):

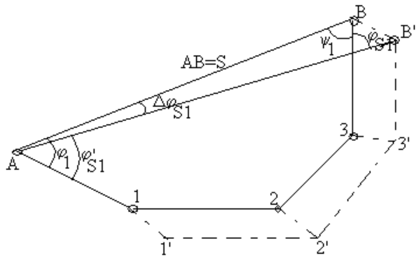

Fig.4

We admit that the side S_1 is measured real with the error ε_{S1}.

This error produces a cross deviation $\varepsilon_{S1}\sin\varphi_1$.

The error on the angle φ_1 will be:

$\Delta\varphi_{S_1} = \frac{\varepsilon_{S_1}\sin\varphi_1}{S}$, total with the error:

$$\Delta\varphi_t = \frac{[\varepsilon_S \sin\varphi]}{S} \qquad (9)$$

Analogous errors occur on the sides of the angle Ψ error:

$\Delta\Psi_{S_1} = -\frac{\varepsilon_{S_1}\sin\varphi}{S} = -\Delta\varphi_S$, with the total error:

$$\Delta\Psi_t = -\frac{[\varepsilon_S \sin\varphi]}{S} \qquad (10)$$

The two total error is equal to the absolute value means that erroneous submission directions are parallel and therefore measurement error due to transverse sides is the same, regardless of where they are determined.

Tercand is obtained average errors:

$$Q_S = \pm\sqrt{[m_S^2 \sin^2\varphi]} \qquad (11)$$

From equation (10) gives:

- Influence errors sides of the sides parallel to the closing line is zero;
- In normal sides participate entire production error error cross sides.

Since the transverse average error due to measurement error aspect is constant, it follows that those found on the punching shear point remains valid.

2.3.Erorile cumulative punching shear in polygons

Since independently errors Q_t and Q_S, the law of propagation of errors, cumulatively allowed, consequently:

$$Q = \pm\sqrt{m_\beta^2[(D - F)^2] + [m_S^2 \sin^2\varphi]} \qquad (12)$$

2.4.Determinarea minimum error point

Note that the error is a function of the average transverse size of the variable "D" so that we can determine an optimal "D_0" the transverse error is minimal.

In this sense writes:

$$\frac{dQ}{dD} = \pm \frac{m_\beta}{q} \frac{2[(D-F)]}{\sqrt{[(D-F)^2]}} = 0 \qquad (13)$$

From equation (12) gives:

$$D_0 = \frac{[F]}{n} \qquad (14)$$

On the other hand, it is important to note that the highest point of submission is considered in the total error is smaller.

How real total errors can be calculated to determine the average errors of relations:

$$m_{\varphi_t} = \pm \frac{m_\beta}{S} \sqrt{[F^B F^B]}$$

And (15)

$$m_{\psi_t} = \pm \frac{m_\beta}{S} \sqrt{[F^A F^A]}$$

Or:

$$m_{\varphi_t} = \pm \frac{m_\beta}{S} \sqrt{[(S - F^A)^2]}$$

(16)

$$m_{\psi_t} = \pm \frac{m_\beta}{S} \sqrt{[F^A F^A]}$$

So if:

$$[(S - F^A)^2] < [F^A F^A] \qquad (17)$$

Then:

$$m_{\varphi_t} < m_{\psi_t} \qquad (18)$$

And the most important is the submission of A. Condition (15) can be written more simply, by developing the following:

$$\frac{[F^A]}{n} > \frac{S}{2} \qquad (19)$$

From the above it follows that the optimal point cross found error midway AB only if symmetric polygons, the angles were measured with the same precision.

Transverse error optimal point value is determined by the relation (7) in which D is calculated by (13), respectively:

$$Q_t = m_\beta \sqrt{nD_0^2 - 2D_0[F] + [FF]} \qquad (20)$$

Or:

$$Q_{t,0} = \pm m_\beta \sqrt{[FF] - \frac{[F]^2}{n}} \qquad (21)$$

The conclusion is that as the distance from the optimum point is higher transverse error increases.

3.CONCLUSIONS

In mining, mining works opening and preparation are very important technical point, have permanent character as the embodiment are high-volume and represent goals that require special financial efforts.

On the other hand the implementation of the projects elaborated in this area is done with topographic methods that have special character by conditions that run and by their quality. The papers presented were studied independent routes used to establish the base topographic topographical elements that lead workings in their execution and have character punching shear.

From angular and distance error study conducted independent polygonal paths, there exists an optimal point where the punching shear is minimal transversal deviation is determined and its position.

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