

A 3 day workshop on “optimizing drill holes strategy/quantify 3D geology & grade variation (uncertainty) and 3 D block estimations” (Mining Geostatistics)

Overview:

Linear Geostatistical techniques, such as ordinary kriging, have been widely used in mining industries for many years. The techniques are widely used for measuring grade variability & uncertainty, designing and optimizing drill holes pattern, defining resource classifications, measuring and quantifying mineralization, assessing ore body, quantifying grade and tonnage variability and use all the information in making an informed and optimized business decision. An understanding of the grade and geological variability and characterizing it (via variogram) is useful for resource estimations. Variography is the crucial tool in analysing drill holes sample information block size studies, volume-variance correction, resource classification, and resource estimation which all depend on the quality of variography. The importance of geological domain and stationarity will be discussed to improve 3 D block estimation when applying ordinary kriging.

The course emphasizes with all the practical features using computer case study, methods, software skills and concepts to enhance participant confidence. The course will introduces a framework for enhanced metal recovery and profitability based on a collection of geostatistical tools available. Time will be allocated in each day in the last hour for participant questions and discussions. A guest overview presentation and participant introduction and background will be given from 9.30 – 10am for all the courses.

Day 1: Monday, July 1 2009 (Spatial Distribution, Visualization and Trend)

Morning Session: (Exploratory Data Analysis)

9.30: – 10.10am	Introduction and Welcomes
10.10 – 10.50am:	Introduction of Geostatistics, why learn Geostatistics
10.50 – 11.40am:	Histogram Techniques/Probability Plot/ Data transformation/mapping of spatial data
11.40 – 11.50am:	Coffee Break
11.50 – 1pm:	Introduction of regionalized variables/Introduction of Variogram- Main features/ Geological domain and stationarity.
1 – 1.45pm:	Lunch

Afternoon Session: (Spatial Continuity of Mineralization)

- 1.45 – 2.45pm: Calculation of experimental variogram/issues with difficult spatial data/variogram properties/behaviour near origin/horizontal and vertical variogram/geometric and zonal anisotropic/introduction of GSLIB, data file format.
- 2.45 – 3.45pm: Family of variogram models (mathematical variogram models)/Fitting a variogram model/Nugget effect, range of influence and sampling quality/uses and limitations;
- 3.45 – 4pm: Coffee Break
- 4pm – 5.30pm: Anisotropy and nested structures in variogram /Address reducing risk by acquiring new information in the pre-feasibility and exploration stage/practical case study with concepts and methods will be demonstrated.

Day 2: Tuesday, June 16 2009 (Resource Estimation)

Morning Session (Support and information effect):

- 10:00 – 11.30am Overview of Support effect & dispersion variance/Volume-Variance Relationship (Affine Correction)/Estimation variance & error/how to change smaller mining units from larger mining units vice versa

11.30 – 11.50am: Coffee Break

11.50 – 1pm: Dispersion variance & change of support, kriging weights

1 – 1.45pm: Lunch

Afternoon Session (Resource estimation based on cutoff values):

- 1.45 – 3.45pm: Building geological model/Resource estimation using inverse distance and ordinary kriging
- 3.45 – 4pm: Coffee Break
- 4 – 5.30pm Cross Validating

Day 3 (Computer Case Study & Commercial Software capability)

Morning Session (Support and information effect):

- 10:00 – 11.30am Introduction of GSLIB Software, data file formatting, exporting data
- 11.30 – 11.50am: Coffee Break
- 11.50 – 1pm: Variogram limitations and scope,/Computer case study using GSLIB software
- 1 – 1.45pm: Lunch

Afternoon Session (Resource estimation):

- 1.45 – 3.45pm: Resource estimation using inverse distance techniques & ordinary kriging. Ore/waste discrimination/ and classification/reporting and JORC/international standard
- 3.45 – 4pm: Coffee Break

4 – 5.30pm

Model Validation and checking IDT and Kriging output/Comparing results obtained from ordinary kriging techniques/Contour map and error map based on ordinary kriging/Measure uncertainty error (error variance) and produce map/Computer case study using GSLIB software Introduction to advanced estimation techniques and conditional simulation

Benefit:

- Acquire with a greater understanding of how fundamental and basic geostatistical concepts and estimation methods used to influence quality of the estimates and decision making process
- How to apply them in practical case study to their own spatial data set.
- Learn how to apply geostatistical estimation methods on public reporting of resource/reserve through innovative geostatistical tools
- Learn how to use geostatistics for the classification & ore/waste materials
- Monitor grade variability, reduce resource estimation risk and increase profits.