JHARKHAND Rai University
UGC RECOGNISED UNIVERSITY
ACCREDITED BY NAAC

MINING ENGINEERING

BTECH

LAB MANUAL

COMPUTER AIDED MINE PLANNING

LIST OF EXPERIMENTS

EXPERIMENT NO. 1

AIM: INTRODUCTION TO COMPUTER AIDED DRAFTING (CAD)

Introduction

Computer Aided Drafting can be done by using the graphic commands available in High Level languages (HLL) like BASIC, FORTRAN, PASCAL, C and C++.
CAD is an important industrial art extensively used in many applications, including automotive, ship building, and aerospace industries, industrial and architectural design, prosthetics, jewellery designing and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals, often called Digital content creation (DCC)

Advantages of using CAD:

- Increases efficiency of your drawings
- Time saving
- Accurate, precise, & immediately alterable

Disadvantages of using CAD:

- Financially costs more per license
- Must and should have computer basicknowledge irrespective of concept

CAD is divided in many types

- 2D
- 3D
- Orthographic
- Isometric
- Perspective

AutoCAD is software based on vector graphic. It is used in creating technological schemes, cross-sections and plans. With AutoCAD it is possible to create 2D and 3D spatial mechanical drawings. Suitable for creating drift, cross-sections schemes, supports in geological crush zones, anchor support schemes, ventilation schemes etc.

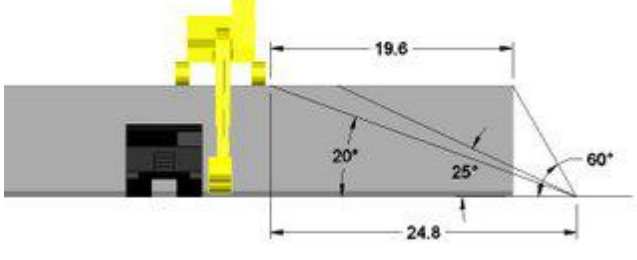

Figure: Bench properties

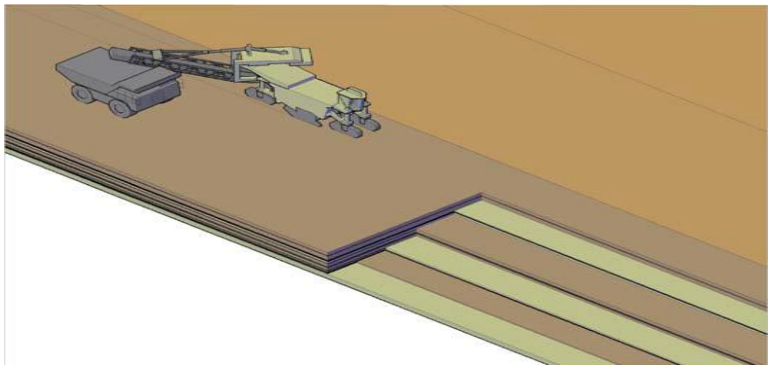

Figure: High selective surface oil shale mining technology modelled with AutoCad AutoCAD homepage http://www.autodesk.com/

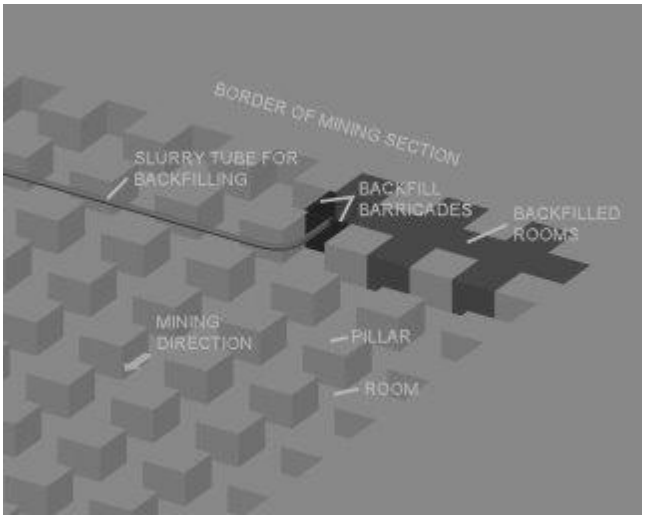

Figure: Mining with backfilling

EXPERIMENT NO. 2

AIM: PURPOSE OF THE LABORATORY OF MINING DESIGN AND PLANNING

Mining Design and Planning is required for mining software systems, test and develop them in scientific and teaching process. The laboratory consists of software, databases, and methods, hardware with necessary equipment (scanners, printers, plotters, savers, presenters, and computer servers), see the website http://mi.ttu.ee/mgislabor

The most used mining modelling software in the laboratory:

1. Gemcom Minex – modelling stratified deposits
2. Gemcom Surpac – modelling mining processing and work procedures
3. Visual ModFlow; AquaChem- groundwater flow and quality modelling
4. MapInfo Professional, Discovery, MapBasic - GIS
5. Vertical Mapper- spatial modelling
6. Encom Discover- spatial modelling for mining environment
7. AutoCAD Civil 3D- planning
8. FLAC – modelling of rock mechanics, dynamics and properties
9. PLAXIS – geotechnical spatial modelling
10. Mining specific software – parameters of pillars, productivity, mining equipment cooperation
and fleet calculations, (Caterpillar and Mining Department of TUT)
11. Ashtech GPS data management and analysing
12. GeoLab

EXPERIMENT NO. 3

AIM: MINEX SOFTWARE FOR MODELLING N DESIGNING.

THEORY:

Minex software is used for modelling and design of stratified deposits. Geological modelling and design for lignite, phosphorite, zinc, bouxite, iron ore and platinum deposits. Is mainly used for Estonian oil shale deposit planning.

With Minex software it is possible to perform: Geological modelling taking into account breaks and water regime. To optimize mining with longwall, reconstruct ramps, overburden coefficient, economical ratio, to calculate volumes. Shortwall mining with blasting scheme, ramps, roads, heap, redirect pollution.

Minex ensures resources are evaluated accurately and mined efficiently from exploration to rehabilitation. As a single integrated solution, data and skills can be readily moved between teams at significant time and cost savings. Across the world, mining companies turn to Minex to more accurately design, plan and implement mining strategies which drive additional efficiencies, increase productivity, control costs and increase profitability.

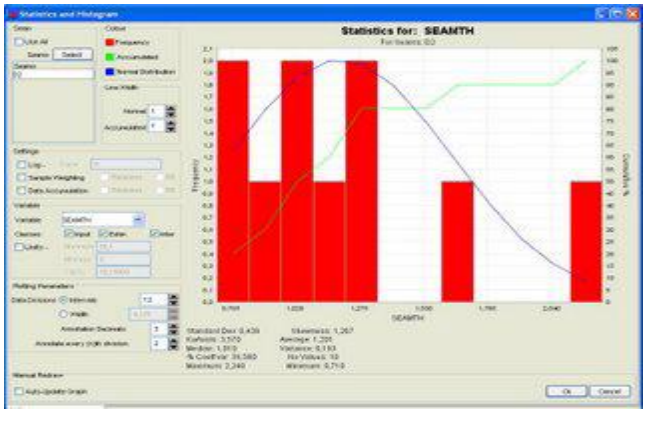

Figure: Statistics and histogram about seam D;

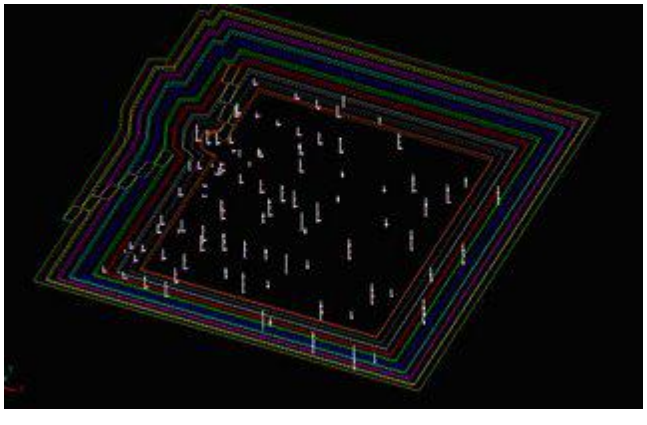

Figure Clockwise and anticlockwise ramp in mining with bench

EXPERIMENT NO. 4

AIM: SOFTWARE SURPAC VISION

THEORY:

With Surpac Vision software it is possible to design and optimize: surfaces mines, underground mines, tunnels, design drillholes and blasting, model blocks, to make geodetic data request etc.

GEOVIA Surpac™ is the world's most popular geology and mine planning software, supporting open pit and underground operations and exploration projects in more than 120 countries. The software delivers efficiency and accuracy through ease-of-use, powerful 3D graphics and workflow automation that can be aligned to company-specific processes and data flows.

BENEFITS:

- Comprehensive tools include: drillhole data management, geological modeling, block modeling, geostatistics, mine design, mine planning, resource estimation, and more.
- Increased efficiencies result within teams from better sharing of data, skills and project knowledge.
- Tasks in Surpac can be automated for compliance with company-specific processes and data flows for increased time savings and consistency of execution.
- Surpac is modular and easily customized to adapt to changing needs.
- Surpac reduces data duplication and interfaces with common file formats from GIS, CAD and other systems.
- Integrated production scheduling with GEOVIA MineSched™.
- Multilingual support: English, Chinese, Russian, Spanish and French.

Surpac Vision homepage and instructions http://www.surpac.com/

EXPERIMENT NO. 5

AIM: SOFTWARE VISUAL MODFLOW PROFESSIONAL

THEORY:

This software is for constructing three-dimensional groundwater flow and contaminant transport modeling. With the ability to simulate groundwater and surface water interactions, and the added capability of calculating changes to groundwater chemistry, groundwater professionals now have a complete set of tools necessary for addressing water quality, groundwater supply, and source water protection initiatives. Modeling results help to make decisions about mining technology and mining operations.

Visual MODFLOW has the tools necessary to:

- Graphically assign model grids, properties and boundaries
- Visualize model input parameters (2D or 3D views)
- Run the flow, pathline, and transport simulations
- Automatically (WinPEST) or manually calibrate the model
- Display and interpret the modeling results in full 3D
- Produce professional reports

Model input parameters and results allow to visualize in two-dimensional cross-sections and schema and three-dimensional to visualize results. Using dynamic model it is possible to create new conditions adding new data and valuate water level, groundwater flow directions, volumes of pumping water in underground mines and surface mines using time.

EXPERIMENT NO. 6

AIM: SOFTWARE MAPINFO PROFESSIONAL

THEORY:
MapIfo Professional is software based on GIS. It allows to manage GIS data, model and manipulate.

MapInfo Professional allows to:
Look map data and geographic coordinates analysis
Carry out data to map
Create maps and plot
Create and refresh map database

Functionality:
Data visualisation: 3 different views: tables, map, graphs. Monitoring data in scale, create new map objects, to associate the map objects with the data in tables, thematic maps, 3D thematic maps, cartographic legend, to combine objects. Spatial analysis: do SQL-queries and saving, spatial queries and buffers.

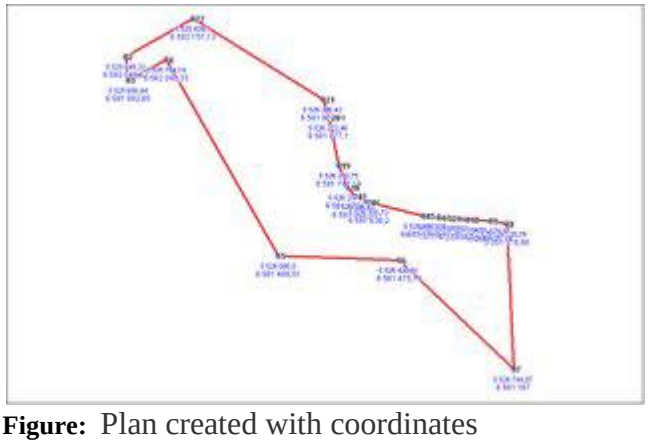

Figure: Plan created with coordinates

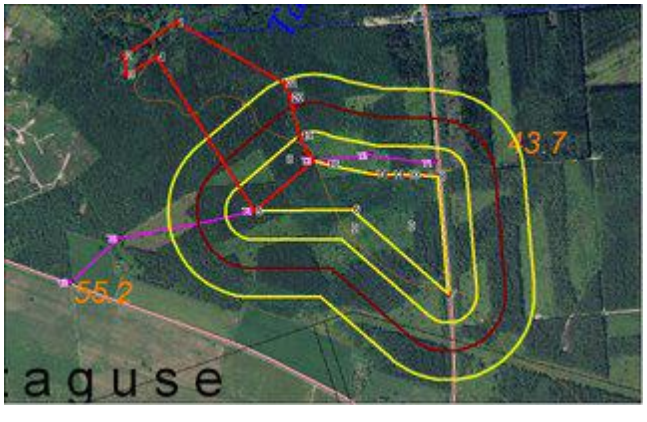

Figure: Buffering mining influences