FLYROCK ESTIMATION

USER MANUAL
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CHAPTER 1 INTRODUCTION

When blasting operations are carried out, the rock gets fragmented and the fragmented material is moved forward to make mucking of the fragmented mass easier and less costly. In addition to this desirable displacement of broken fragments in case of surface mine blasting or excavation blasts some stone pieces can get torn and travel to very large distances. Usually this unexpected projection of stone is termed as 'Flyrock' (Fig. 1). Flyrock is a serious environmental hazard and is often a cause of fatalities, serious injury to people, damage to equipment, buildings, property, etc.

![Fig. 1 Flyrock during blasting](image)

Terrock has developed a flyrock model that simplifies what is dynamically complex problem in physics. The algorithm makes use of a limited number of significant factors it is practical to measure and control in the field. The model is calibrated in actual field conditions, and further observations are made thereafter to confirm model performance. Based on this model, FlyRock Predictor software is developed.

FlyRock Predictor software will allow user to ‘design your own flyrock’. The quantification can be used to establish both safe clearance distances and the critical range of burdens and stemming heights. The zone of flyrock travel is indicated by this tool.

Inputs to the software are charge mass, burden or stemming height and a site constant that lays within a general range that can be fine-tuned by site calibration and the output is flyrock distance.
1.1 SYSTEM REQUIREMENT

FlyRock Predictor has been developed to run on personal computer under Microsoft XP/2007 using Microsoft Access database. Following are the recommended minimum requirement:

*Memory requirement: 32 MB of RAM for better functioning of the software*
*Storage requirement: Hard disk drive with 50 MB of free space*
*Installation requirement: CD-ROM Drive 32X Drive, USB port*
*Display requirement: XGA graphics (1024x768 display)*
*Supporting requirement: Mouse and keyboard*

FlyRock Predictor is designed for XGA graphics (1024 * 768). Although it will operate in SVGA graphics mode (640* 480), some of the items may be obscured or cut short in the smaller screen area, such as dialog boxes, query windows and status line messages.
1.2 Installation:

Run the executable file i.e. setup.exe on the host machine. Software will be installed by default in C:\Program Files\FlyRock Predictor folder.

Following files will also get copied to the Application folder:

1.0 Executable file
2.0 Database file
3.0 Help file
4.0 User Manual file

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CHAPTER 2: SYSTEM ARCHITECTURE

2.1 Screen Layout

Flyrock Predictor main screen has:

2.2.1 Title Bar

This is top most part of the screen with application logo and name. This displays name of the application “FlyRock Predictor”. Title bar also contains minimize and close buttons.

2.2.2 Menu Bar

This is portion of application screen just with the title bar. This consists of menu items defining the basic functionality of the software. Following are menu items present in menu bar.
CHAPTER 3: GENERAL FUNCTIONS

Flyrock Predictor incorporates several functions:

**Mine Details:**
This allow user to save mine details which include Mine Name, Blast Location and Logo of the Mine. This information has to be filled as it is needed in Generate Report function also.

![Mine Details](image)

On Clicking Save Mine button, the details will be saved and if user does not want to save this details then click on Cancel button.

**Design Parameters:**
Following parameters are required to predict the flyrock and to calculate throw of the blast. These includes:

- Burden
- Charge Mass
- Drill Hole Angle
- Drill Hole Diameter
- Stemming Height
- Constant
- Plant Equipment safety factor
- Personal safety factor

The user can use the default parameters by clicking on Set Default button. It also allow user to edit these parameters as per their operational requirement.
Calculate Throw:
On clicking, Calculate Throw button which will give the user the value of Throw (front of face) and throw (behind of face) in meters by calculation with above parameters.
**Predict Flyrock:**
Clicking on the Predict FlyRock button, the system will ask user to save the particular design. If user want to save the design, click on Yes button and if not then on No button.

When clicking on Yes button, the user will allow to save the particular design by giving Design Name and comments (optional). Click on, save design button will save the particular design and cancel button will not save the design.

The output of flyrock prediction is in 4 options:

> **Table**

This will give the prediction results, Throw (Front and Behind of face) in tabular format. By default the increment in burden and stemming is of 1. As per this burden and stemming value the throw is calculated and values are formulated in the below tables, separately for throw in **determination of throw in front face (m)** and **determination of throw in behind face (m)**.
The user can change the value of increment burden and stemming as per their requirement and click on Ok button. It will automatically change the difference between the burden and stemming values in the table and calculate throw of front face and behind face both.
Chart

The results will be displayed in the graph format in which x-axis defines the burden value (in meters) and y-axis will show the throw value (in meters).

A show data points check box is provided, when user will check this the data points (burden and throw value) is displayed on the graph.
When a user will click on Generate Report button, user will have to save the design before it. Click on Yes button will generate report and if user does not want to save these changes, then click on No button.

After clicking Yes button, a report will be generate for this particular design parameters in pdf.
Display
The outcome is displayed in this graphical design which specifies 3 regions in meters for behind and front of face.

1. Maximum throw
2. Plant clearance
3. Personnel clearance

When a user will click on Generate Report button, user will have to save the design before it. Click on Yes button will generate report and if user does not want to save these changes, then click on No button.

After clicking Yes button, a report will be generate for this particular design parameters in pdf.
➤ Safety Distance
The outcome is displayed in this graphical circular design which specifies 2 regions:
1. Safety Distance (300 m)
2. DGMS (500 m)

User is allow to change the safety distance as per their convince, by clicking on change safety distance button. User enter the value of safety distance and click on change button.

Now, with the new safety distance the result will be displayed.
The Zoom in and zoom out options allows user to view the display in enlarge or small form.

When a user will click on Generate Report button, user will have to save the design before it. Click on Yes button will generate report and if user does not want to save these changes, then click on No button.

After clicking Yes button, a report will be generate for this particular design parameters in pdf.
Charge Mass Calculation:
This function allow user to calculate the charge mass. When user click on ChargeMass Calculation option, it will ask user whether to calculate charge mass.
If user want to calculate Charge Mass then click on Yes button, otherwise No button to cancel.

For calculating Charge Mass following parameters are required:

- Hole Diameter
- Bench Height
- Hole Angle
- Subgrade
- Stemming Height
- Explosive Density

By default, certain values are there.

User is allowed to edit these values:
To calculate the Charge Mass for these parametric values, click on Calculate button and the result will be displayed below and close button will close the window.
Design:
The design has several incorporate function which includes New, Open, Save and Import Design.

- **New Design:**
  When user want to create a new design, click on New and allow user to edit the design parameter values.

- **Open Design:**
  To open any design for a particular mine, user have to click on this which gives you the previously saved design. The number of designs saved are specified in this and allow access to user either to open the design or to delete the particular design. If user want to delete all the designs then click on Delete All button and if no changes are required then click on close button.
➤ **Save Design:**
It allow user to save the particular design. For that user have to give Design Name and comments if required for particular design. Click on Save Design button will save the design and if user does not want to save the design click on cancel button.

➤ **Import Design:**
Import design option allows importing design from another system to software.
The process for importing includes following steps:

1. Click on the Import design, specify the file name.
2. Click on the browse button for selecting design file to import. On Clicking Browse button following dialog box will appear.

3. Select design file which has to be imported.
4. On clicking open button, design name will be listed in the box of the Selected File.
5. Now click Import button.
To close the window, click on close icon button of the window.

**About:**
This option specifies about the product itself. It specifies that FlyRock Predictor (Version 3.2.0) is the copyright product of Earth Resource Technology. All its rights are reserved.