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Title: **ROFMOD 5 - Tutorial 1: Basics**  
 Author: Christian Baumann  
 Time needed: About 45 minutes

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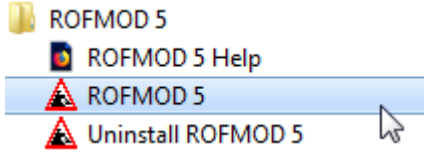
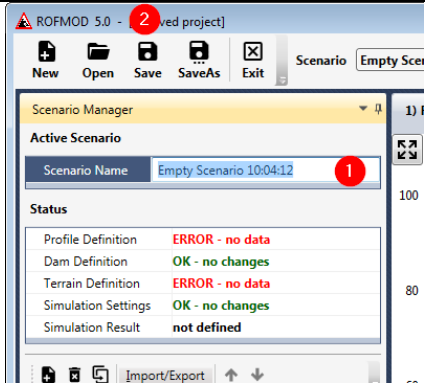
## Summary

In this tutorial we would like to show the basic steps in ROFMOD 5. We will first **create a 2D profile**, **define the terrain parameters** and then **run the rockfall simulation**. The **creation of the output document** concludes this tutorial.

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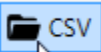
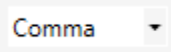
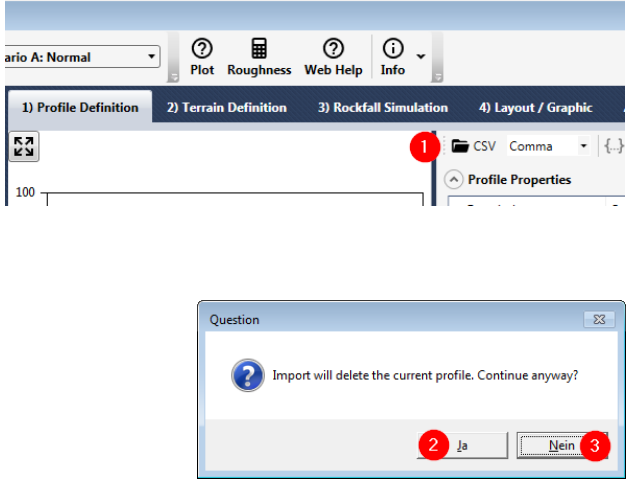
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## 0. Starting ROFMOD 5

<p>Start "ROFMOD 5" on your Windows PC</p>	
<ol style="list-style-type: none"> <li>1. Give the scenario a meaningful name, for example "Scenario A: Normal"</li> <li>2. Save the ROFMOD project on your PC, for example as "Demo_Project"</li> </ol>	

## 1. Profile Definition

ROFMOD 5 allows the import of x/z values from text files. The profile points should be slightly generalized, i.e. not too dense, captured, and without artifacts such as stair trends.

<p><b>1.1 Load profile points</b></p> <ol style="list-style-type: none"> <li>1. Click on  <b>CSV</b>  and select the already prepared comma separated text file with the profile points "Tutorial1_Profile.csv" from your hard disc. (If you cannot find the CSV file, see next step.)</li> </ol> <p>ROFMOD will ask you, if you really want to discard the existing profile.</p> <ol style="list-style-type: none"> <li>2. "Yes" to continue and load new profile</li> <li>3. "No" to abort loading a new profile</li> </ol>	
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!) If you don't have a text file with profile points, just copy the values on the right hand side to a text file and call it "Tutorial1\_Profile.csv"

```
0.00,1550.00
10.00,1548.00
19.00,1545.00
23.00,1540.00
25.00,1530.00
28.10,1526.00
30.00,1522.00
35.00,1517.00
40.00,1510.00
45.00,1507.00
50.00,1500.00
58.00,1489.50
66.00,1489.50
67.00,1491.50
70.00,1491.50
74.00,1487.00
90.00,1480.00
106.00,1474.00
110.00,1474.00
125.00,1472.00
140.00,1472.00
```

### 1.2 Change existing profile point

1. Select the profile point at x=50 in the list.
2. Selected profile point is shown in plot
3. Change the point's coordinates to x= 49 / z = 1499

The screenshot shows the GEOTEST software interface. The main window is titled "Scenario A: Normal" and has a menu bar with "Plot", "Roughness", "Web Help", and "Info". The interface is divided into several tabs: "1) Profile Definition", "2) Terrain Definition", "3) Rockfall Simulation", "4) Layout / Graphic", "Animation", and "Dam".

The "Profile Definition" tab is active, showing a plot of the profile. The y-axis is labeled "z (m a.s.l.)" and ranges from 1450 to 1600. The x-axis is labeled "x (m)" and ranges from 0 to 100. A yellow shaded area represents the "Starting Zone" from x=0 to x=20. A black line represents the "Profile". A red 'X' marks a "Selected Point" at x=50. A legend in the top right of the plot area identifies the symbols: a yellow triangle for "Starting Zone", a black line for "Profile", and a red 'X' for "Selected Point".

The "Profile Properties" panel on the right shows the following data:

Description	\PROFIL_Tutorial1.csv
Number of Points	21
Profile Height	78.00
Profile Length	140.00
Profile Slope	29.12
Starting Zone Begin	20.00
Starting Zone End	30.00

The "Starting Zone Begin" and "Starting Zone End" values are shown with up and down arrows, indicating they are adjustable.

The "Profile Points" section shows a list of points (x / z) and a "Selected Point" section with input fields for x and z values. The x value is set to 50.0 and the z value is set to 1500.0. The "Profile is valid: Yes" checkbox is checked.

The list of points is as follows:

0.00 / 1550.00
10.00 / 1548.00
19.00 / 1545.00
23.00 / 1540.00
25.00 / 1530.00
28.10 / 1526.00
30.00 / 1522.00
35.00 / 1517.00
40.00 / 1510.00
45.00 / 1507.00
50.00 / 1500.00

The point at x=50, z=1500.00 is highlighted in blue in the list. The x and z input fields in the "Selected Point" section are marked with red circles 1 and 3 respectively, indicating where the user should enter the new coordinates (49 and 1499).

### 1.3 Add new profile point

1. Write "55" in the first field, tap Enter to switch to second field
2. Write "1495" in the second field and tap Enter to add the point to the profile points list.
3. Instead of tapping Enter after step 2, click this button to add the point to the list.

The screenshot shows the GEOTEST software interface. The 'Profile Definition' step is active. The plot displays a profile with a starting zone (shaded area) and a selected point (marked with a red X). The 'Profile Properties' panel shows 'Starting Zone Begin' at 20.00 and 'Starting Zone End' at 30.00. The 'Add Point' section has 'x' set to 55.0 and 'z' set to 1495.0. A '+' button is visible next to the 'z' field. The 'Points (x/z)' list shows the new point at the bottom.

### 1.4 Edit the starting zone

1. Let's change the starting zone end to "25".
2. The start zone is displayed graphically in the plot.

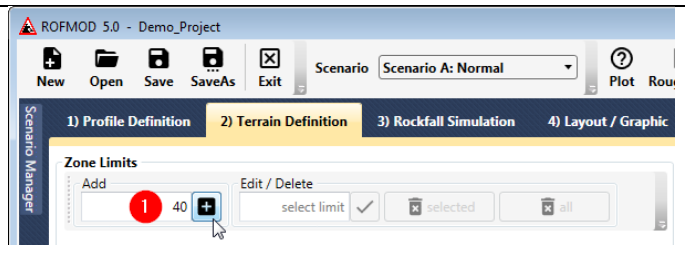
The screenshot shows the GEOTEST software interface. The 'Profile Definition' step is active. The plot displays the profile with the starting zone (shaded area) updated to end at x=25. The 'Profile Properties' panel shows 'Starting Zone End' set to 25.00. The 'Add Point' section has 'x' set to 0.0 and 'z' set to 0.0. The 'Points (x/z)' list shows the new point at the bottom.

## 2. Terrain Definition

With the zone parameters you can characterize the underground in certain zones with different roughness and damping. You can also define forest zones. The dimensions of the zones are defined by their zone limits. The first zone is inserted by default between the start and end of the profile and contains the default values for damping and roughness.

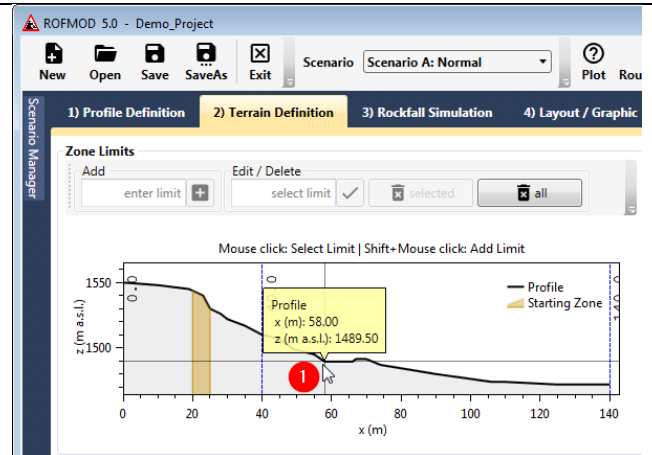
### 2.1 Define zone limits by value

1. Enter a value (e.g. "40") and add the zone limit, either by tapping Enter or by clicking the add button.  
A new zone limit at  $x=40$  is added and displayed in the plot.



### 2.2 Define zone limits by click

1. Position the mouse cursor at  $x=58$  and click on the plot while holding down the Shift key.
1. It is very likely that you will not hit the point at  $x=58$  exactly. You can move this zone boundary in the next step.

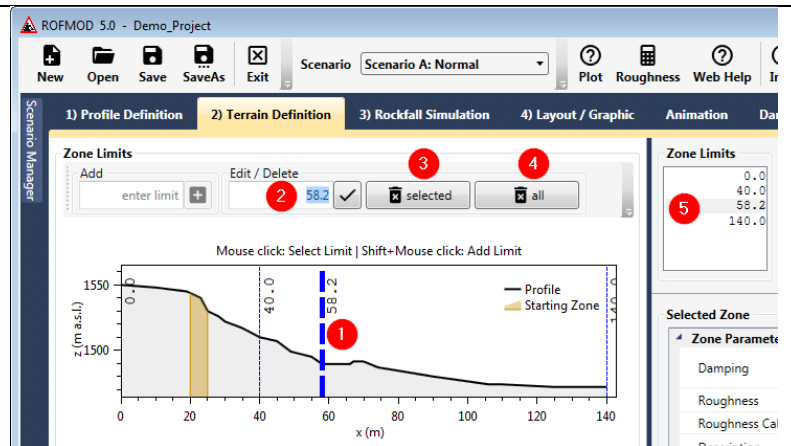


### 2.3 Change a zone limit

1. Click on the zone limit you want to change. It will be highlighted in blue.
2. Change the x-position to "58" then tap Enter or click on the check mark.

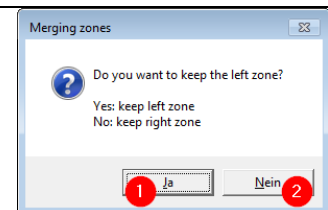
**Remarks (do not execute for exercise):**

3. If you want to delete the selected limit, click here.  
When deleting zone limits, you are asked how the two zones to be merged should be handled. → see 2.4
4. If you want to delete all zone limits (including all zone parameters), click this button
5. Alternative possibility to select a zone limit



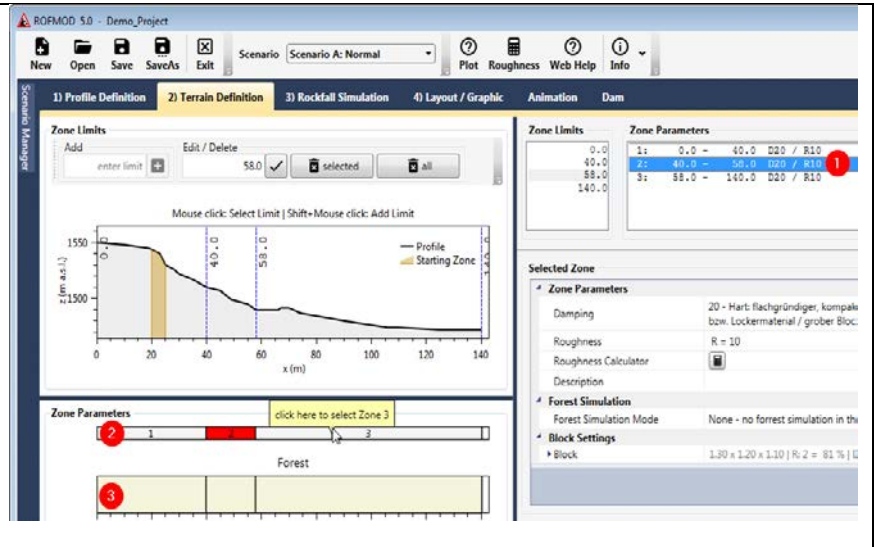
### 2.4 Merge zones

1. Answer the dialog with "Yes" to keep the parameters of the left zone, or
2. "No" to keep the parameters of the right zone



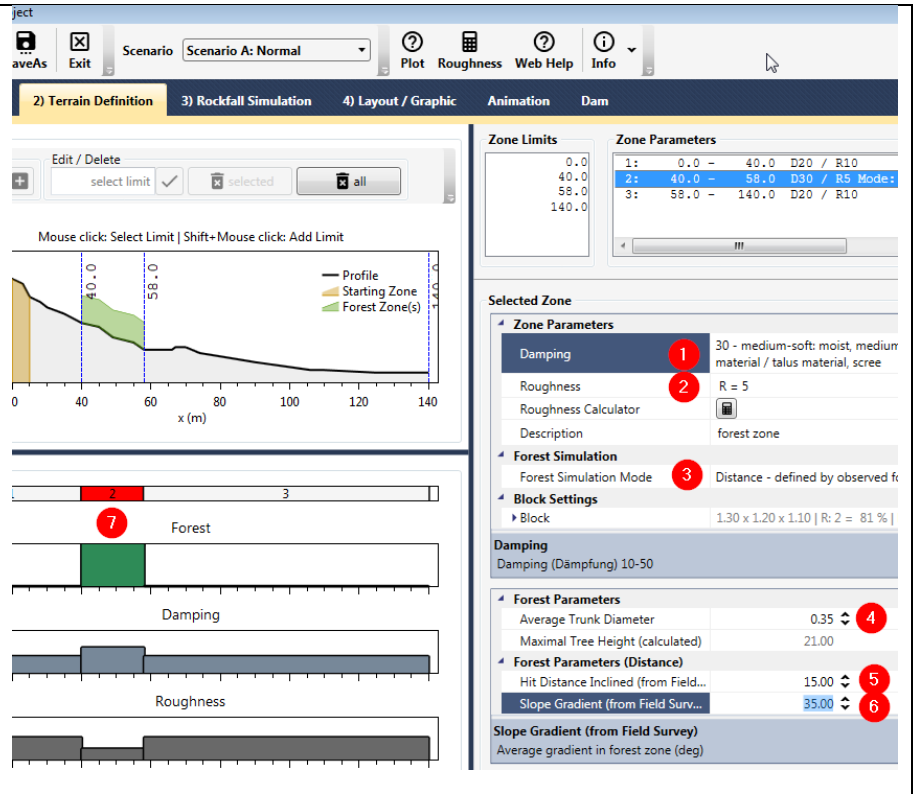
### 2.5 Select zone

1. You can select a zone in this list. Please select zone "2".
2. You can click on the zone numbers to select a zone. It will be highlighted in red.
3. You can also click on the forest, damping or roughness plots to select a zone.



### 2.6 Edit zone parameters

1. Set the damping to "30"
2. Set the roughness to "5"
3. Choose Forest Simulation Mode "Distance"
4. Check if the average trunk diameter equals "0.35" m
5. Change the inclined hit distance to "15" m
6. Check if the slope gradient equals "35" deg
7. See how the graphic representation of the zone has changed.

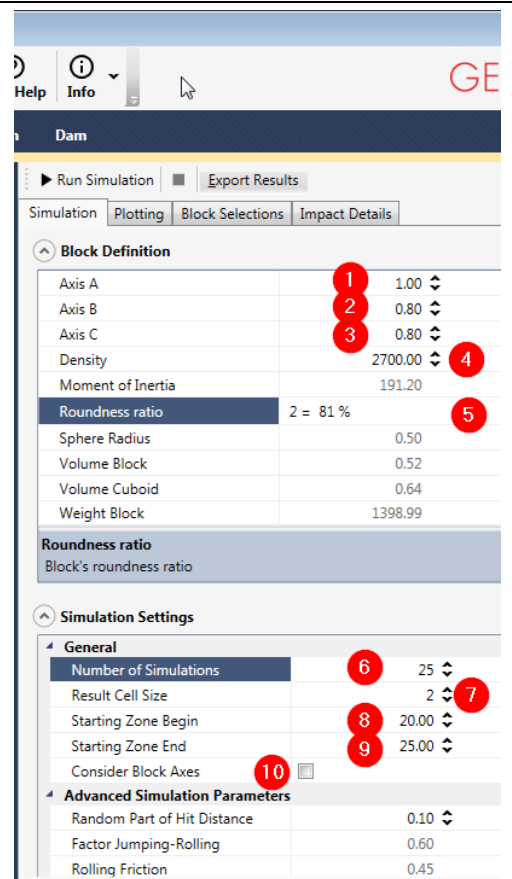


### 3. Rockfall Simulation

Before the rockfall simulation can be carried out, the profile and the terrain parameters must be defined.

#### 3.1 Block definition and simulation settings

1. Block Axis A (longest block axis). Set it to "1.0" m
2. Block Axis B (medium block axis). Set it to "0.8" m  
Remark: First you have to set Axis C, before you can reduce Axis B.
3. Block Axis C (shortest block axis). Set it to "0.8" m
4. Check if Density equals "2700"
5. Check if Roundness Ratio is set to "2=81%"
6. Increase the number of simulations to "25"
7. Decrease the cell grid size to "2"
8. Check again the Starting Zone Begin
9. Check again the Starting Zone End
10. "Consider Block Axes" is an important option that is covered in tutorial "ROFMOD 5 – Tutorial 3: Dam"

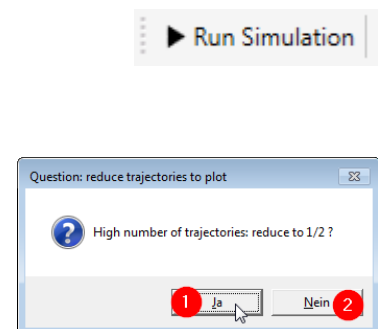


#### 3.2 Run rockfall simulation

Click on this button to start the rockfall simulation.

Remark: If your number of simulations is greater than 20, ROFMOD will ask you if all trajectories should be plotted:

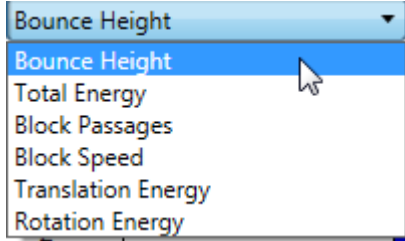
1. Click on "Yes" to reduce the number of plotted trajectories (recommended and faster)
2. Click on "No" and all trajectories will be plotted. This can reduce the display performance.





### 3.3 Examining block trajectories and statistics

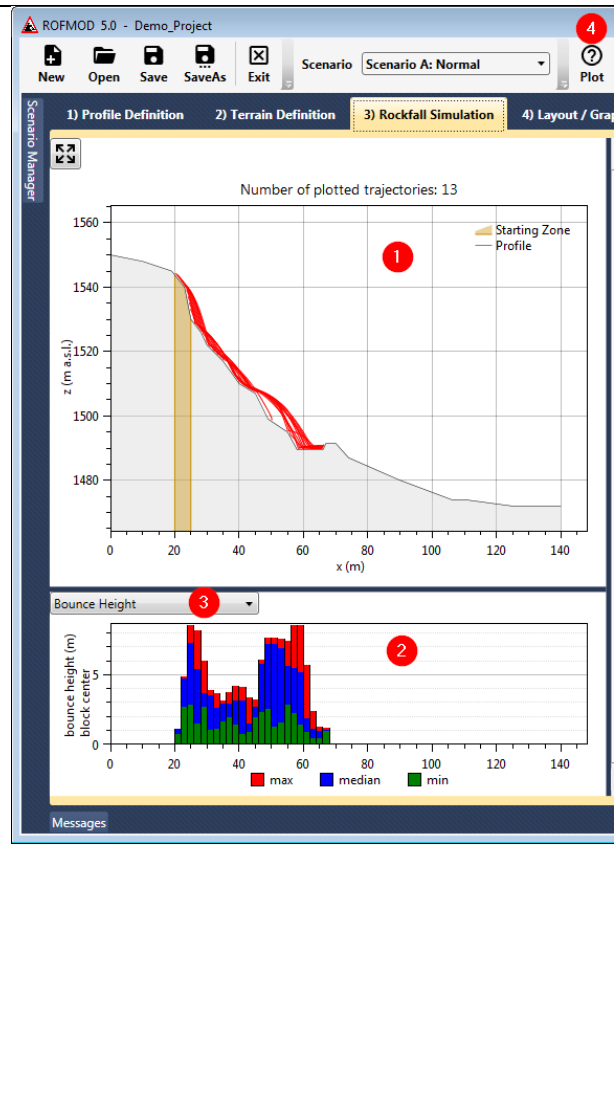
1. This plot shows selected block trajectories.
2. This plot shows the statistics with a resolution of "Result Cell Size".
3. Choose between the different statistic topics



- Bounce Height: vertical distance above terrain
- Total Energy
- Block Passages
- Block Speed
- Translation Energy
- Rotation Energy

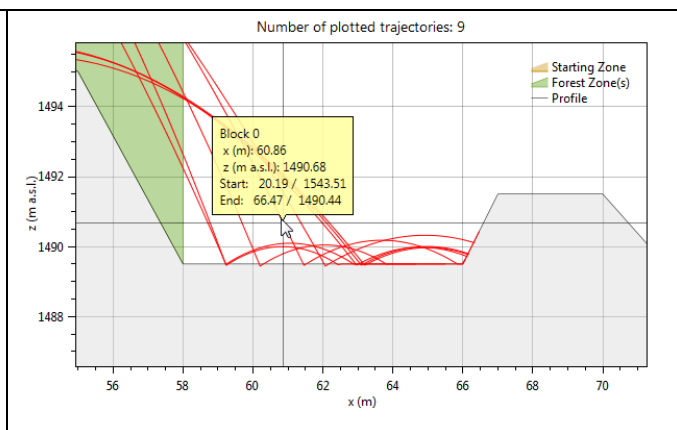
4. Help for plot navigation can be found here.

Operation	Command
Pan	Right mouse button or arrow keys
Zoom	Mouse wheel or PageUp/PageDown
Zoom by rectangle	Middle mouse button or Ctrl + Alt + Left mouse button
Reset	Button A or Home Button
Copy image	Ctrl + C



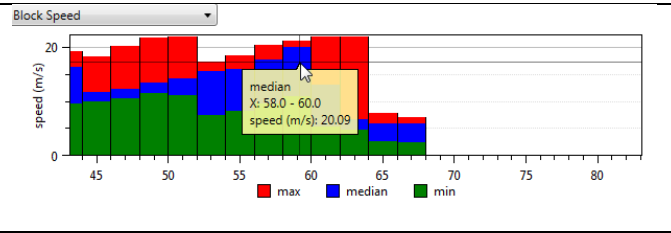
### 3.4 Trajectory details

By clicking on the trajectory the block ID, the start point and the end point of the trajectory can be displayed.



### 3.5 Statistic details

The statistical values can be displayed by clicking on the columns.



### 3.6 Display options

1. Check "Plot Forest Zones" to display the forest zone between x=40 and x=58
2. Check "Plot Tree Hits" to show the effects of the forest zone

### 3.7 Block selections

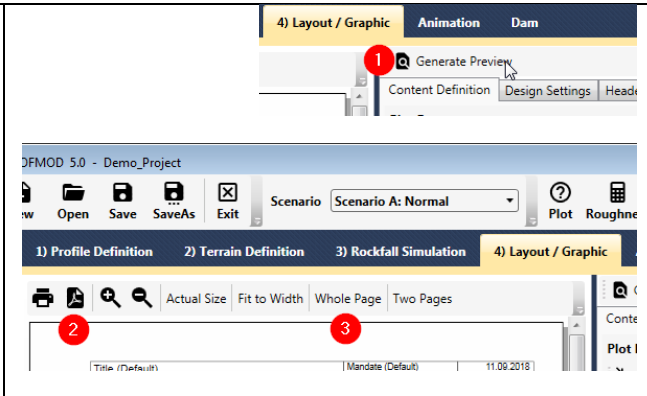
1. Click on "Select All" to show all 25 trajectories
2. Set the divisor to "3" and click on "Select Modulo" to show only every third trajectory

## 4. Layout / Graphic

The simulation result can be prepared in a variety of ways and exported as a PDF file. First the content is defined, then the type of presentation, and finally the headers and labels.

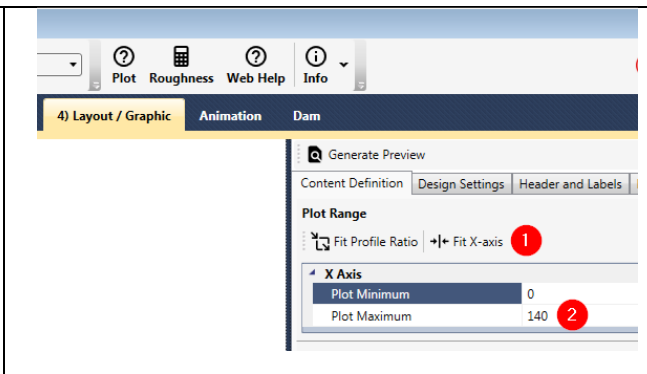
### 4.1 Generate preview

1. Click on "Generate Preview" to automatically create a preview.
2. The PDF file can be created with this button.
3. To navigate in the document preview, you can, for example, display the entire page.



### 4.2 Define plot range

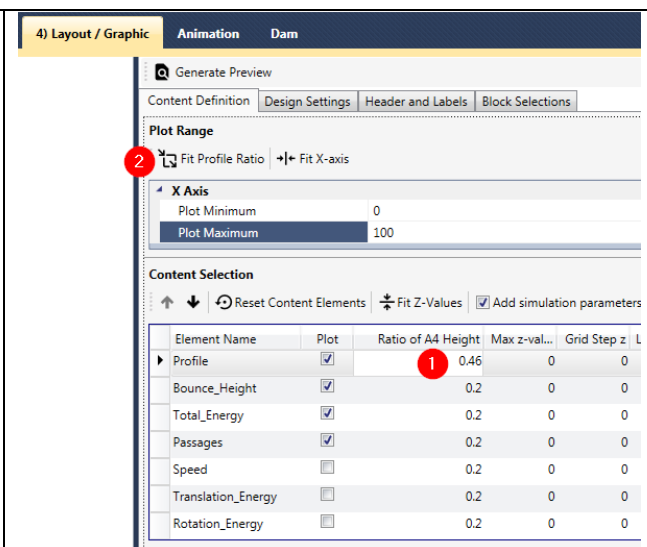
1. Click this button to adjust the x-axis area so that the entire profile is drawn. The plot maximum will be set to "140" (if not already set by default).
2. The plot area can be defined here. Let's change the plot maximum to "100".



### 4.3 Adjust the display height of the profile

1. The "Ratio of A4 height" must be adjusted so that the profile can be displayed over the entire height. "0.46" is not sufficient. You can generate a preview to see this.
2. Click here to automatically adjust the profile ratio. The value in the table will be set to "0.61".

Please create a preview to see the effects of this change.

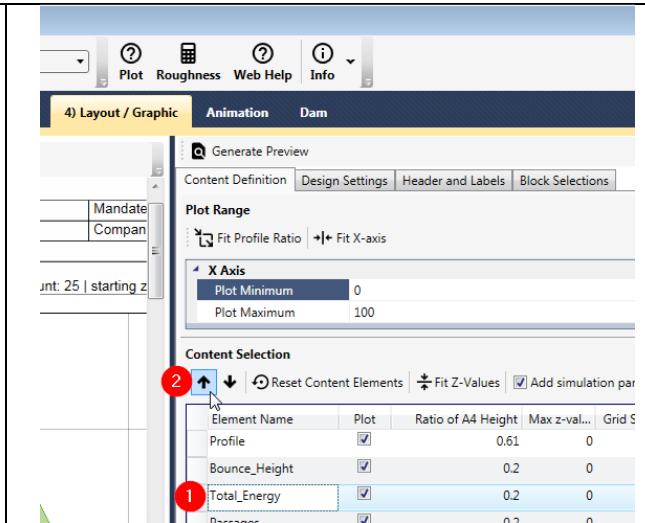


#### 4.4 Rearrange plot content

Let's try changing the arrangement of the plot content.

1. Select the line "Total\_Energy"
2. Move it one row up by clicking the up arrow.

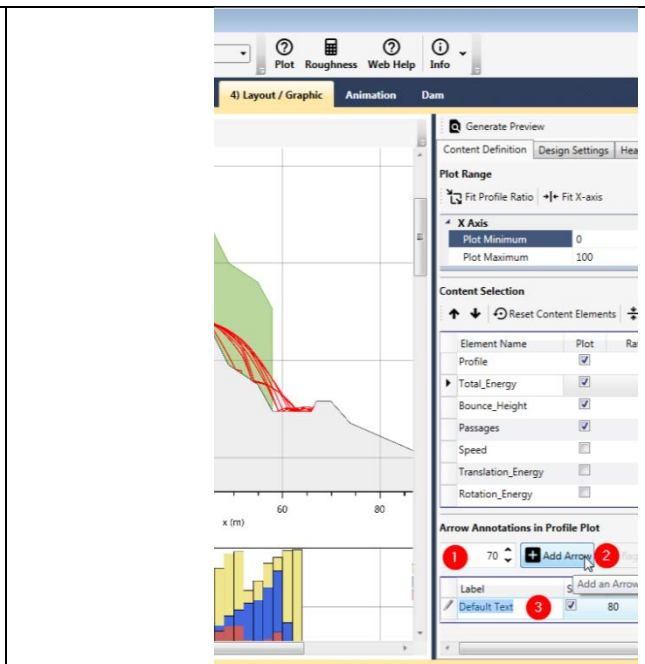
Don't forget to generate a new preview in order to see the changes made to the plot.



#### 4.5 Add an annotation arrow to the profile plot

1. Enter the position of the arrowhead. For example x="70".
2. Add arrow annotation to the plot. It will automatically be inserted with a label.
3. Change the label to "protection dam".

Don't forget to generate a new preview in order to see the added arrow annotation in the plot.



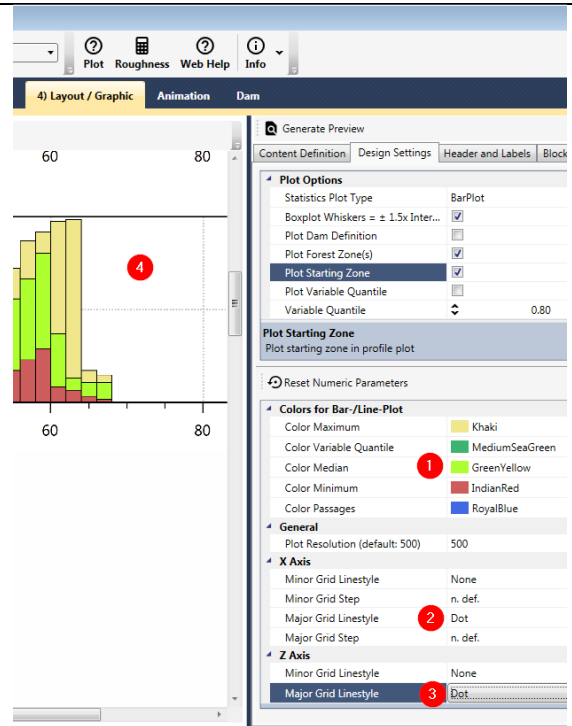
#### 4.6 Change the design of the diagrams

For some reason, your customer wants the median color to be light green or similar. In addition, all grid lines (vertical and horizontal) should be dotted and not solid.

1. Choose a light green color for the median. For example "GreenYellow".
2. Choose "Dot" for the vertical grid lines.
3. Choose "Dot" for the horizontal grid lines.

Generate a new preview, please.

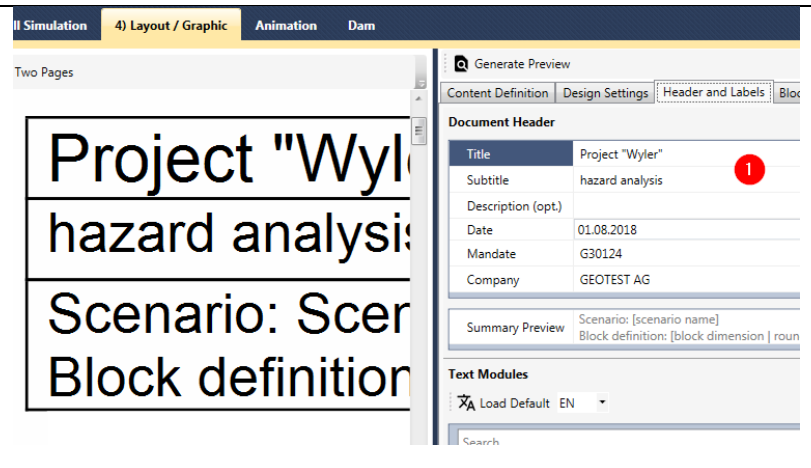
4. Examine the changes in the plot.



#### 4.7 Define document header

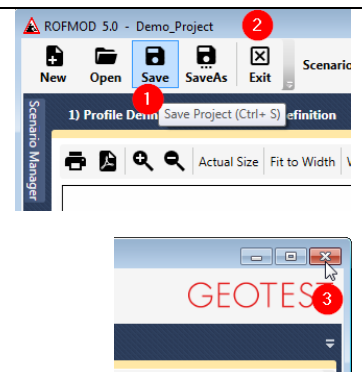
1. Please provide content to the rows "Title", "Subtitle", "Mandate", and "Company". By leaving "Description" empty, this row will not be plotted in the header.

Generate a new preview, please.



## 5. Closing ROFMOD 5

1. Don't forget to save your ROFMOD project before quitting the program.
2. Quit ROFMOD by either clicking on "Exit", or
3. Click on the "X" in the upper-right corner.



## 6. Load finished scenario (Optional task)

If you want to examine the finished scenario without going through all the steps, you can load the prepared project file.

1. Click "Open" to open an existing project file.
2. Confirm the dialog that warns you that the current project is lost with "Yes".

Open the project file "Tutorial1\_Demo.pzip"

