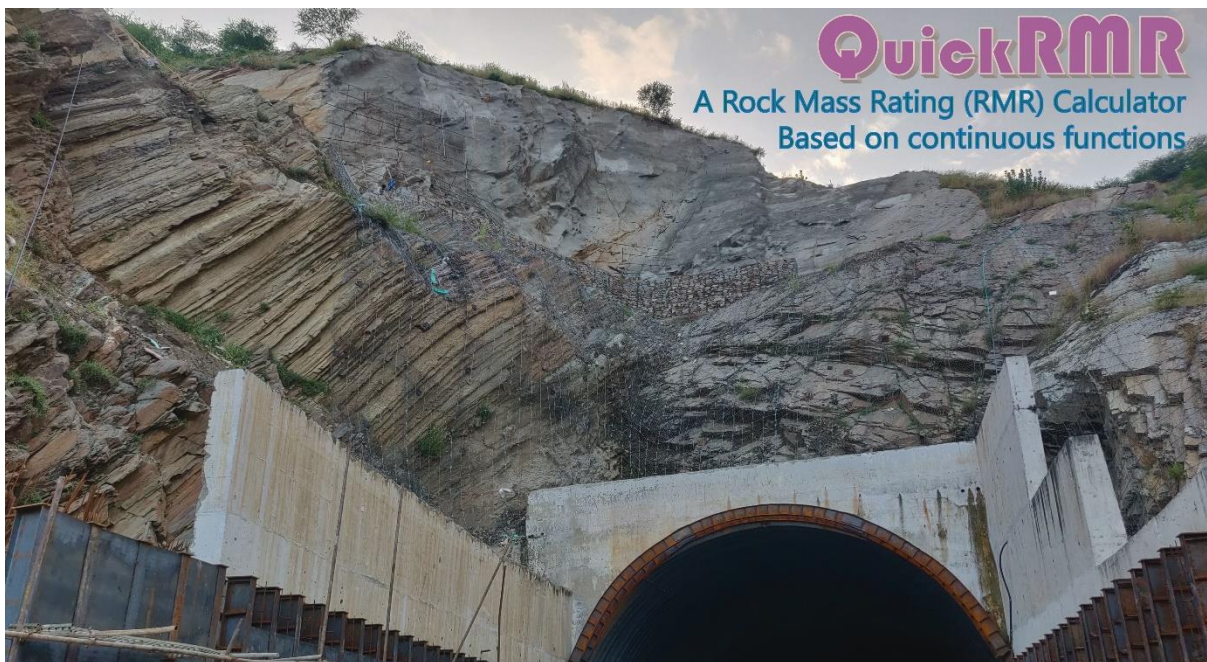


User Guide to QuickRMR

1. Introduction:

'QuickRMR' is a windows computer program and has been developed to calculate both RMR89 and RMR14 using the new continuous functions proposed by Kundu et al. (2020). This computer program aims at making the RMR determination automatic, easy and convenient. The program is freely available and is distributed under an open-source license ([GNU General Public License 3.0](#)). The user can calculate, store, update and delete RMR data for several locations and finally can export ratings of all locations to an MS Excel file.



The above figure shows rock mass at a tunnel portal containing diverse lithological and structural condition. The portal has been partially installed with support systems. (Photo credit: Dr. Harsh K. Verma, Sr. Scientist, CSIR-CIMFR).

The software can be installed on a Windows Operating System preferably on Windows 7 or higher.

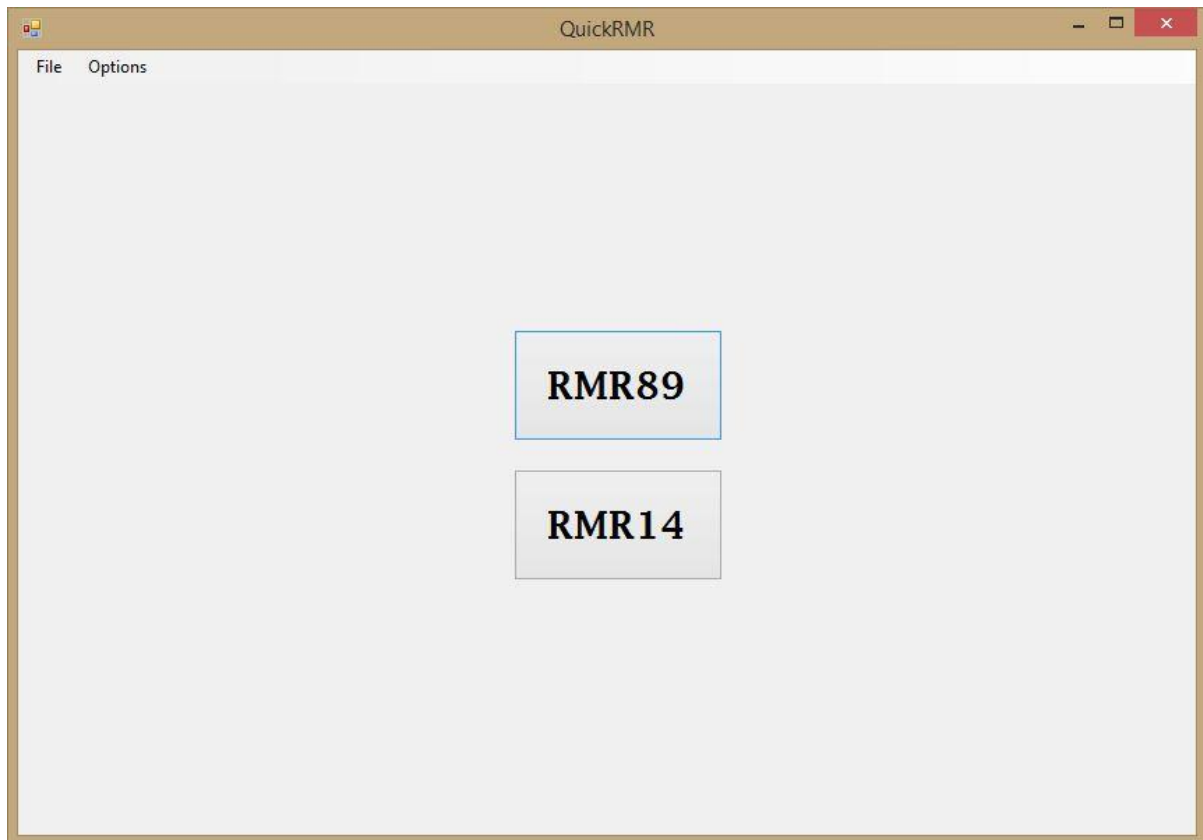
Other requirements:

.NET Framework 4.0

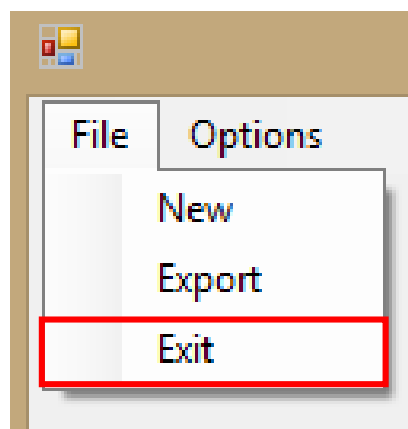
SQL Server Express LocalDB 2017

Microsoft Access Database Engine

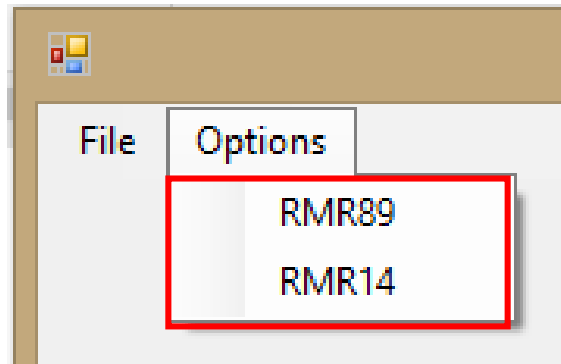
The above requirements have been bundled with the installation setup. After successful installation, upon launching the program, the window should look like below image.



To exit at any time, you can click on the red cross at the upper right corner of the application or you can click **File -> Exit**.



To calculate Rock Mass Rating (RMR) using the continuous functions for version 1989, click on the “**RMR89**” button or if you wish to calculate RMR using continuous functions for version 2014, click on “**RMR14**”. However, you can change to any version at any time by clicking the dropdown in the Options tab.



If you navigate to the RMR89 page, the interface should look like this.

QuickRMR

File Options

CONTINUOUS RMR (BASED ON BIENIAWSKI 1989)

Location Id

Strength of Intact Rock MPa

☒ UCS/PLSI ☐ R Value (N-Type)

Rock Quality Designation %

Spacing of Discontinuities mm

Ground Water Condition ...

☒ Measured ☐ General

Adjustment Rating (F0) and Or

Conditions of Discontinuity:

☒ Parameter based ☐ Overall

Persistence m

Aperture mm

Roughness (JRC) (0-20)

Infilling mm

Weathering (*I5) Ru5 Rw1

Location Id	UCS	PLSI	RQD	Spacing	Ground Water (General)	GW Inflow	JW Pressure

The below figure introduces all the features, functionality and design of the application in the RMR89 interface.

Continuous RMR (BASED ON BIENIAWSKI 1989)

Location Id: 4_Nigulsari

Strength of Intact Rock: UCS 146.0 MPa

Rock Quality Designation: 67.0 %

Spacing of Discontinuities: 360 mm

Ground Water Condition: JW Pressure 0.10 MPa

Adjustment Rating (F0): Slopes and fair Or 0.0

Conditions of Discontinuity: Parameter based Overall

Persistence: 6.00 m

Aperture: 4.0 mm

Roughness (JRC): 5.0 (0-20)

Infilling: Soft 3.0 mm

Weathering (*IS): 47.0 RuS 28.0 Rwl

Buttons: Clear, Calculate, Update, Delete Record, Export

Parameters Rating

Parameters	Rating
UCS	10.6
RQD	13.9
Joint Spacing	11
JW Pressure	8.6
Persistence	2.1
Aperture	0.9
Roughness	1.5
Soft Infilling	3
Weathering	3.2
Adjustment Rating	-25

RMR 30
BASIC RMR 55

Table:

Location Id	UCS	PLSI	RQD	Spacing	Ground Water (General)	GW Inflow	JW Pressure
1	10.3	0	9.7	13.1	0	12.7	0
2_Rampur	0	10.6	9.7	13.1	0	12.7	0
3_Nigulsari	0	10.6	11.3	11	0	0	8.6

Continuous RMR (BASED ON BIENIAWSKI 1989)

Location Id: 4_Nigulsari

Strength of Intact Rock: UCS/PLSI R Value (N-Type) 45.0 RN 2.50 p (gm/cc)

Rock Quality Designation: 67.0 %

Spacing of Discontinuities: 360 mm

Ground Water Condition: Measured General Wet Or 0.0

Adjustment Rating (F0): Slopes and fair Or 0.0

Conditions of Discontinuity: Parameter based Overall

Excellent Or 0.0

Very rough surfaces
Not continuous
No separation
Unweathered wall rock

Buttons: Clear, Calculate, Update, Delete Record, Export

Parameters Rating

Parameters	Rating
UCS	6
RQD	13.9
Joint Spacing	11
Ground water	7
Joint Condition	30
Adjustment Rating	-25

RMR 43
BASIC RMR 68

Table:

Location Id	UCS	PLSI	RQD	Spacing	Ground Water (General)	GW Inflow	JW Pressure
1	10.3	0	9.7	13.1	0	12.7	0
2_Rampur	0	10.6	9.7	13.1	0	12.7	0
3_Nigulsari	0	10.6	11.3	11	0	0	8.6

Annotations:

- Displays ratings for individual parameter
- Updates ratings for selected location
- Exports Multiple RMR outputs to one excel file
- Displays details rating for all location
- Takes N-Type Rebound Hammer value when direct UCS is unavailable
- Takes General GW condition when quantitative value is absent
- Takes Overall Discontinuity condition When quantitative value for individual discontinuity parameters are unavailable

2. Procedure to calculate RMR.

Fill the "location Id" in the given box. To input, the value of a parameter, convert your obtained value to the unit provided at the right side of each parameter. For "Strength of Intact rock", you can use the test value "UCS/PLSI". In case, UCS/PLSI value is not available, you may use the rebound value ("R-Value") of N-type Schmidt hammer. Input the Value for "Rock Quality Designation" (RQD), and "Spacing of discontinuities".

For “**Ground Water Condition**”, if you have measured data for groundwater flow or joint water pressure, select the “**Measured**” radio button. Otherwise, you can input ratings for general conditions by clicking “**General**” radio button and choose your ground condition from the dropdown list. You can also input rating based upon your decision in the right text box. The value in the text box will be considered if nothing has been selected from the dropdown list.

Ground Water Condition

☐ Measured ☒ General Select Or 0.0

Adjustment Rating (F0) Completely dry and Select Or 0.0

Conditions of Discontinuity:

☒ Parameter based ☐ Overall

For discontinuity “**Adjustment Rating**”, choose your project type for which you wish to obtain the rating. Then select from the dropdown list based on the severity of the condition as a result of discontinuity orientation. You can also input rating based upon your decision in the right side text box. Note that value in the right side text box will only be considered if the dropdown boxes are not selected; otherwise, the rating will be calculated according to the dropdown selections.

Select

Tunnels & Mines

Foundations

Slopes

Select

Very Favourable

Favourable

fair

Unfavourable

Very Unfavourable

For “**conditions of discontinuities**”, if you have measured data for each parameter, click on the “**Parameter based**” radio button; otherwise, click on the “**Overall**” radio button. If the Parameter based radio button is selected, fill the value for persistence, aperture, and roughness. For **Roughness**, You have to input the JRC value. For more on this parameter, refer to Kundu et al. (2020).

For “**infilling**”, select “**Hard**” of “**Soft**” for hard infilling and soft infilling from the dropdown list, respectively. If you don't have any infilling material, select “**None**”. In case, you choose “**Hard**” of “**Soft**”, fill the Infilling thickness in the right side text box.

“**Weathering**” in this application is calculated from rebound hammer data. Input the “**Ru₅**” and “**Rw₁**” Value obtained from the site. For more about these parameters, please refer to Kundu et al. (2020).

If you do not have quantitative values for discontinuity conditions, Select “**Overall**” radio button. Then select an appropriate condition from the dropdown list. The description of the condition is given right below the selected box. You can also input rating based upon your decision in the right text box.

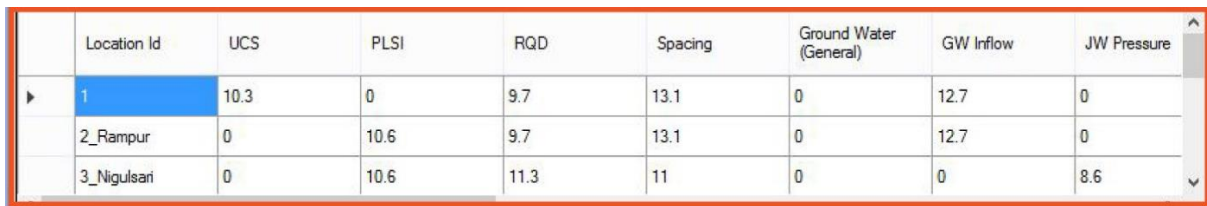
After you input the value of the parameters, click on the **calculate** button.

3. View and export calculated results:

The calculation result will be shown on the upper right side of the interface. You can also see the ratings of each parameter for your current calculation in the list box present at the right side of the interface.

RMR 30	
BASIC RMR 55	
Parameters	Rating
UCS	10.6
RQD	13.9
Joint Spacing	11
Jw Pressure	8.6
Persistence	2.1
Aperture	0.9
Roughness	1.5
Soft Infilling	3
Weathering	3.2
Adjustment Rating	-25

Your current calculation has been stored in the data grid view present at the bottom of the interface. You can calculate RMR for many locations which will be stored in this data grid view.



	Location Id	UCS	PLSI	RQD	Spacing	Ground Water (General)	GW Inflow	JW Pressure
▶	1	10.3	0	9.7	13.1	0	12.7	0
	2_Rampur	0	10.6	9.7	13.1	0	12.7	0
	3_Nigulsari	0	10.6	11.3	11	0	0	8.6

If you wish to update the ratings for a location/site at a later time, click on the location grid below the location id and re-input the appropriate value of the parameter and then click on the "**Update**" button. The rating for the location will be updated according to the parameters' values.

If you want to export the ratings for each parameter for the locations you have calculated, click on the "**Export**" button. Your data will be exported to an MS Excel file. Save the Excel file at an appropriate place on your computer. If you do not want your data to be stored in the application, click on the "**Delete Record**" button. All your data will be deleted from the data grid view.

If you want to clear all the input value in the boxes, and results in the list box, click on the "**Clear**" button.

The operation for the RMR14 interface is similar to that of the RMR89 interface. After clicking the "**RMR14**" button, the interface should look like the following image.

QuickRMR

File Options

CONTINUOUS RMR (BASED ON Celada et al. 2014)

Location Id

Strength of Intact Rock MPa

☒ UCS/PLSI ☐ R Value (N-Type)

Number of Discontinuities/m %

Ground Water Condition ...

☒ Measured ☐ General

Adjustment Rating (F0) and Or

Conditions of Discontinuity:

Persistence m

Roughness (JRC) (0-20)

Infilling mm

Weathering (*I5) Ru5 Rw1

Alterability (Id2) %

Adjustment factor (Fe)

Adjustment factor (Fs)

RMR
BASIC RMR

Parameters Rating

Location Id	UCS	PLSI	Number of discontinuities/m	Ground Water (General)	GW Inflow	JW Pressure	Persistence

During usage, if you find any bugs or errors in this application, email me at email@jkundu.com to make the app more convenient and error-free. Your Questions/Comments/ suggestions are highly valuable for me.

If you use the software for calculation of RMR or any other purpose, cite the software as:

Kundu, J., Sarkar, K., Singh, A.K., & Singh, T.N. (2020). QuickRMR beta. A Rock Mass Rating calculator based on continuous functions. <https://jkundu.com/quickrmr> (download date).

Cite the article for continuous functions used in the software as:

Kundu, J., Sarkar, K., Singh, A.K., & Singh, T.N. (2020) Continuous functions and a computer application for rock mass rating. Int. J. Rock Mech. Min. Sci.