

Design of Building Columns using RCF Software

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Date of Submission: 02-08-2020

Date of Acceptance: 20-08-2020

ABSTRACT: The designing, re-analyzing and the load calculation of column option is very important in order to correctly design any floor or any building. In this research paper, the display of the loads coming on the column of the building and the details of the reinforcement schedule is discussed here in detail. There is no restrictions of the floor as this is an added advantage of the RCF software which satisfactorily justifies its use in designing the columns of tall buildings.

Keywords: RCF, Beams, Columns, tall buildings

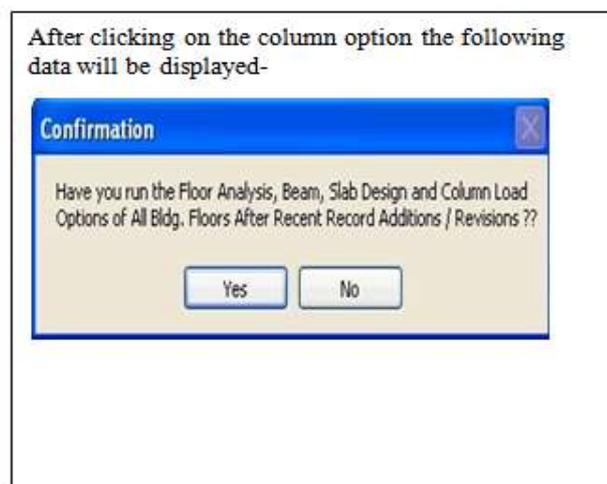
I. INTRODUCTION

Column or **Pillar** is a building element whose use in architecture or in an structural engineering is to transmit the weight /load of a building or structure above to the structure below it then in to the hard strata through compression, or we can say that the weight of above to the structural elements below it. In other words we can conclude that the column is a compression member. That is the reason why we have to design the columns of the building as it transfer the whole

load of building to the ground. Any of the miscalculation or wrong design will lead the structure to face a great damage or even the structure may even collapse. Now a days there are many softwares on the market to analyse and design the building columns. RCF is also one of the software which is used for this purpose. This RCF software not only performs the analysis but can also used to design the columns of a multi-storey buildings. Here in this the results are displayed in the form of the SF, BM of beam and column and also with its reinforcement summary. It also gives the bar bending schedule of the beams and the columns. This software can be used to analyse and design columns for various load options including different wind loads, live load etc.

II. METHODOLOGY/ANALYSIS

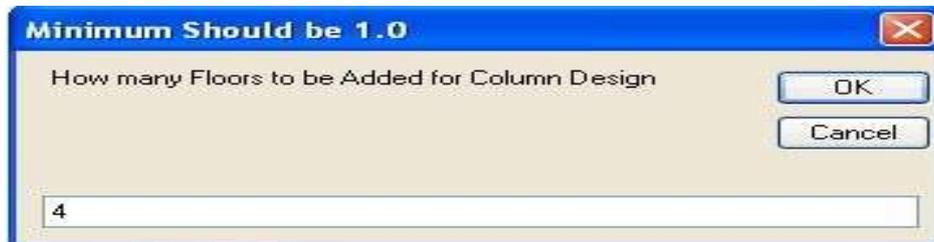
Method of analysis through RCF software is described as follows. When the programs run the graphic below is displayed. Now on this under the Floor/Col/Fdn heading click on the "Column" option-



In order to design all of the columns of the building we must run first the Analysis of Slab , beam design and the columns load of the floor individually . If columns are having moments then they ought to be incorporated using edit/delete/add/display option before performing floor analysis. Also any of the changes in the

column parameters should be administered at this stage . Then after this give a suitable name to your column project to do further design.

Note that the column project file name is end with an extension ".dat" , while the floor file extension are with ".rcf" , Now click on the save button, the following window will appear .



Here the no. of floors can be the no. of storey of a multi-story building or will be the no. of storeys +1 , to account for the ground floor . Now click on the "open" button, following window will appear



In order to build or make a column project , I have indicated four floor files, corresponding to 4 floors. Actually here Example_4, Example_3, Example_2 are typical floors ' I have created , now analyzed and designed one floor (Example_4) and copied this floor file to Example_3,Example_2 and Example_1. Now click on the Read me button, the following relevant info is displayed as given below-

- This option develops column project file
- User should specify file name for every floor of the building . Use add floor file button.
- File name for every floor shall be different.
- File name for floors can not be repeated .
- The program will add the column loads of respective floors for every of the column.

- This option is to be run after Analysis / Design and column load option of every floor (File) has been performed .
- Start from the top floor .
- Floors of the same building is to be added every time.
- Same floor file can be given repeatedly just in case of typical floors using copy all button , and later edited to create a different file name.
- All columns on the floors should be same in numbers and location .
- Column designated on all floors should be same.
- The column addition or subtraction/deletion between the floor levels is not permitted.

- Floors will always be start from the Floor no. - > 001 as it makes the understanding of the user easier.
- This floor no. -> 001 could be Ground floor of the building having only the plinth beams + walls , but no slabs.

There is no restrictions while choosing the no. of the floors . Now click on the finish button to further proceed . Following window will be appeared on screen displaying the column -.

DISPLAYING COLUMN LOADS OF BUILDING

File Name : C:\000RCF\example.dat

Column Number	Cummulative Loads
C1 : Floor No. -> 004	34.713
C1 : Floor No. -> 003	69.426
C1 : Floor No. -> 002	104.139
C1 : Floor No. -> 001	138.965
C2 : Floor No. -> 004	54.037
C2 : Floor No. -> 003	108.074
C2 : Floor No. -> 002	162.111
C2 : Floor No. -> 001	217.047
C3 : Floor No. -> 004	44.538
C3 : Floor No. -> 003	89.076
C3 : Floor No. -> 002	133.614
C3 : Floor No. -> 001	178.714
C4 : Floor No. -> 004	29.715
C4 : Floor No. -> 003	59.43
C4 : Floor No. -> 002	89.145
C4 : Floor No. -> 001	118.859
C5 : Floor No. -> 004	35.774
C5 : Floor No. -> 003	71.548
C5 : Floor No. -> 002	107.322
C5 : Floor No. -> 001	143.321
C6 : Floor No. -> 004	102.909
C6 : Floor No. -> 003	205.818
C6 : Floor No. -> 002	308.727
C6 : Floor No. -> 001	414.785
C7 : Floor No. -> 004	77.34
C7 : Floor No. -> 003	154.68
C7 : Floor No. -> 002	232.019
C7 : Floor No. -> 001	311.385
C8 : Floor No. -> 004	49.548
C8 : Floor No. -> 003	99.096
C8 : Floor No. -> 002	148.644
C8 : Floor No. -> 001	198.98

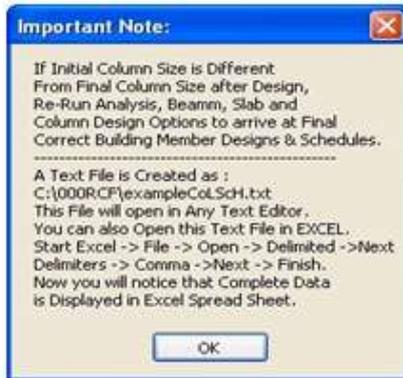
Now click on the Ok button , then the column schedule will be displayed as under . It is to be considered by the user that the column design is fully automatic , input by the user is not required . After that click on the Read me button . here we get the following information in addition to design philosophy -

- The column size is in mm.
- The maximum size =600x1800 mm
- T indicates the Tor steel.
- d indicates the mild steel.
- @ means that the spacing of bars is in mm c/c.
- Nos means the links per set.
- ERROR indicates the error of design.
- Refer LOG file for the details of error.
- Always run the analysis , beam and slab design options before running the column design to avoid the ERROR in the design process.

- Refer the Std. column details for the reinforcement details of the column.
- Column design is based on the theory to keep the percentage of steel fixed at 0.80 percent, for a given section of the column.
- If the taken section is inadequate then the longer section dimension will increase by 50 upto 1000 mm. But in case if still the section is unsafe then the shorter dimension will increase up to 600 mm.
- now after reaching the 600 x 1000 mm section , if the column section is still unsafe then the longer dimension of the section will be increase 1800 mm. But if still the column section is unsafe then the steel percentage will be increase by 0.1 percent to 3.0 percent.
- After reaching to this limit the error message will be flashed.

- If the user still want to keep that of the column size to be fixed then the user should give the

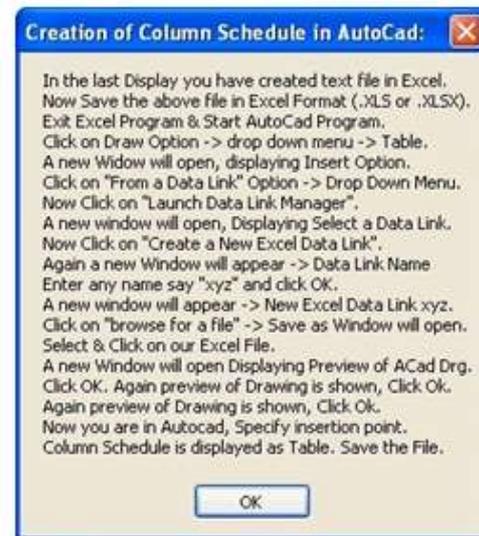
initial steel percentage approximately high.



The above message display describes the creation of column schedule in AutoCAD.



Here the message regarding the column designing , re- analysing and the column load calculation is very much important in order to reach at the correct floor design . Here the other message is regarding exporting the column schedule file to the EXCEL which will be further used to it's re-exporting to the AutoCAD software.



III. CONCLUSION

Design of building columns are explained in this research paper using RCF software. Summary reports and output of RCF software are also mentioned briefly. This software is highly effective and can be used in consultancy firms which not only gives output with great accuracy but also serves time offering flexibility to the users in case of alterations of drawings during the construction work which often took place in actual practice.

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