

Rubicon Newsletter

September 2008

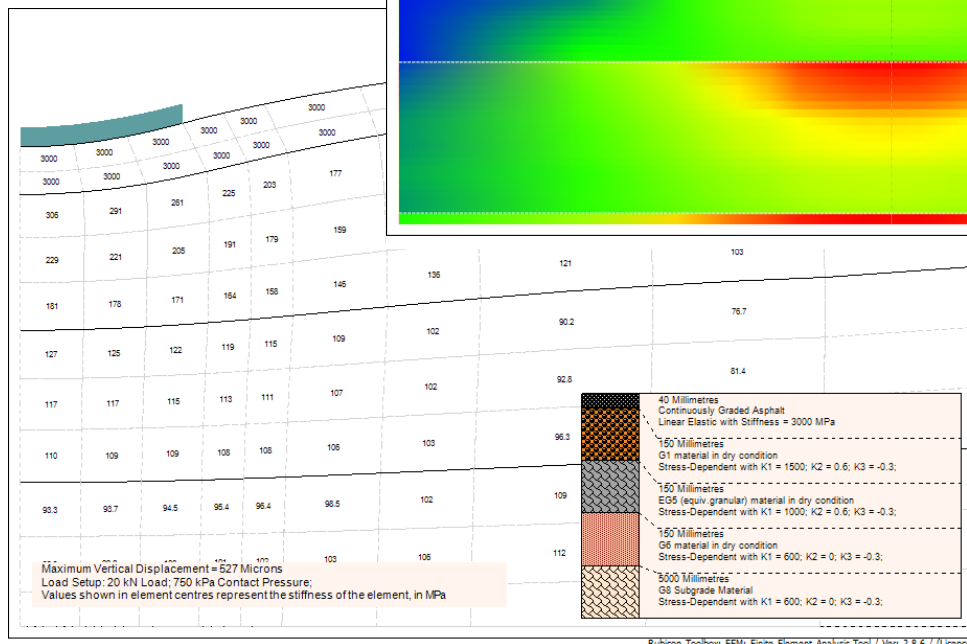
Rubicon Toolbox: New Release, Version 2.8.6

The latest version of Rubicon Toolbox, 2.8.6 has some exciting enhancements. A Finite Element Tool similar to that which was included in Rubicon 1 has been made available, and is briefly discussed below. A feature to calculate cumulative differences to help identify potential uniform sections has been included in the Data Viewer Tool. Some new Failure Criteria have been added. These features are discussed overleaf. More details of minor changes, enhancements and bug fixes can be found on our website.

Rubicon Toolbox Feature: Finite Element Tool

The Finite Element Tool has finally been released! The Tool is useful for in-depth and sophisticated analyses of stresses and strains within a pavement structure. Key aspects of the Tool are:

- The pavement is modelled using an axisymmetric finite element model.
- The finite element mesh is automatically generated.
- Materials are modelled as stress-dependant using the Universal Soil Model.



The Tool has several methods of presenting results:

Stiffness and Deformation Plot: This plot is used to view the stress-sensitive stiffnesses at different locations in the pavement and to view the deformation of the pavement. The scale of the deformation is set by the user.

Contour Plot: This plot shows the distribution of stresses or strains within the pavement structure, as shown in the figure for the Bulk

Stress. The plot is used to show where the maximum stresses and strains occur and to compare stress and strain distributions of different pavement structures. The colour scale can be set by the user.

Results Grid: This function generates stress and strain values for a specified grid. The grid is generated for a horizontal or vertical influence line, or using a grid spacing defined by the user. The results can be exported to Excel for further analysis.

The results from the Finite Element Tool should be used in a relative and comparative manner, and should not be used as an absolute estimate of the stresses and strains in the pavement. More details on the Tool are available in the Rubicon Toolbox Help files. A document detailing the accuracy of the Tool has been prepared and can be downloaded from the website.

The cost of the Rubicon Toolbox Finite Element Tool is R 10 500. The tool is available for free to users who purchased Rubicon 1 and a discount is applicable to maintenance paying users.



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Brief Summary of New Features

Cumulative Differences in the Data Viewer: After many requests, we have included a Cumulative Differences (commonly known as CUSUM) feature in the Data Viewer. This feature is used with Bar or Scatter strips. When selecting the option, a line showing the cumulative differences for the selected data is plotted on the strip. This line assists in selecting possible start and end points of uniform sections.

Waterbound Macadam Failure Criteria: The transfer functions (failure criteria) for Waterbound Macadam have been added to the defaults database. If you would like to utilize them, ensure you import the failure criteria when you run an upgrade. For more details on importing new Failure Criteria, Loads, Materials or Categories, see the downloadable instructions on our website. Remember that you can define your own transfer functions in Rubicon Toolbox using the set of predefined functional forms.

Brief Summary of Modifications

Defining Pavement Materials: The materials input window has been modified. Special material properties required for the transfer functions (failure criteria) are saved in the defaults database and are called when a transfer function is selected. Previously, if these special material properties were modified by the user, and then the transfer function was changed, i.e., from Category A to Category B, the special properties defaulted back to those stored in the defaults database. This has been changed. Now, when special material properties are modified, and then the failure criteria changed, the material properties entered are retained as long as the failure criteria is of a similar form and uses the same special material properties. Two examples that demonstrate how this works are:

- If a G2 Granular Material is selected, the default Failure Criteria (Under Edit Material Properties, Mechanistic Design) is Granular Material Category A and the cohesion and friction angle are 53.4 kPa and 51.19 degrees, respectively. Now, say you change the cohesion and friction angle to values you have obtained from triaxial testing on your specific material. Then, you realize that you actually need Granular Material Category B and when you select that from the drop down list the cohesion and friction angle values you entered will remain and will not change back to the default values.
- If you select a C3 cemented material with a RSA Cemented Fatigue Cat B failure criteria and then change this to an EG5 (equiv. granular) material in dry condition, any special material properties will not be saved because the form of the failure criteria has changed and the special material properties are different.

Grading Comparer: The colours used to differentiate the "Too Coarse" and "Too Fine" areas have been lightened.

Uniform Section Summaries: All statistics included in the Uniform Section Summaries are now exported to Microsoft Excel, including the Pavement Section Data.

Backcalculation: In the Backcalculation Tool, the lower limit of the backcalculation range used for the lower subgrade (substratum) was decreased from 80 to 10 MPa. This change is to accommodate very soft subgrade situations. The change means that backcalculation results may differ slightly from previous analyses, but the differences should not be substantial.

Training

The last **Pavement Design and Analysis Course** for 2008 will be held in Cape Town on **9 and 10 October**. This course covers fundamental pavement data analysis and pavement design, by means of lectures and worked assignments.

In the **Data Viewer Course**, attendees obtain a thorough knowledge of the Data Viewer Tool and learn tips and short-cuts for using the Tool. Although the course is not scheduled for this year, should the demand be sufficient a course can be arranged.

We are also available to run **In-house Courses** at your offices, on either of the existing courses or a customized course can be developed. An in-house course is a good team building exercise, as well as being a valuable learning experience. Earlier this year we ran a Rehabilitation Design Workshop for a Consulting company where we spent 2 days running through a rehabilitation analysis and design using real project data. Although it was hard work, we all found it very beneficial.

Course dates for 2009 will be scheduled early next year. If you have a date preference or would like a course scheduled in your city, contact our offices.

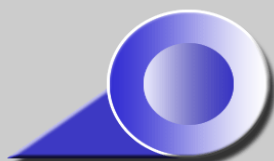
Our courses are accredited for CPD points. For additional information on the courses, or to register, contact MAS.

MAS News

- We are still having big problems with our Telkom phone lines. Should you need to get hold of us, please contact Marlou Bredenkamp on +27 82 331 9479, Fenella Long on +27 83 399 0090, Arno Hefer on +27 82 958 9508 or email info@modsys1.com.
- Fritz Jooste is currently working on some exciting enhancements for Rubicon Toolbox and continues to do consulting work in New Zealand.
- Arno Hefer is currently working on Guidelines for the Network Measurement of Skid Resistance for the Road Materials Committee of COTO.
- Fenella Long is involved in the final stages of compiling the new guideline for Bituminous Stabilised Materials on behalf of SABITA and the Gauteng Department of Public Transport, Roads and Works. The launch of the guideline will be publicized by the Asphalt Academy (www.asphaltacademy.co.za).
- We are also working on including the pavements studied as part of the Bituminous Stabilised Materials knowledgebase in the SANRAL Pavement Performance Information System. The PPIS can be viewed at www.ppis.roadrehab.com.
- In between the research work we do some consulting work. This work is generally related to rehabilitation projects, and we subcontract to Consultants.
- Marlou Bredenkamp deals with all our administration, including all maintenance issues and new software purchases.

Comments and Suggestions

To ensure Rubicon Toolbox continues to meet your needs, please communicate your ideas, questions and suggestions—and, of course, bugs—with us!



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