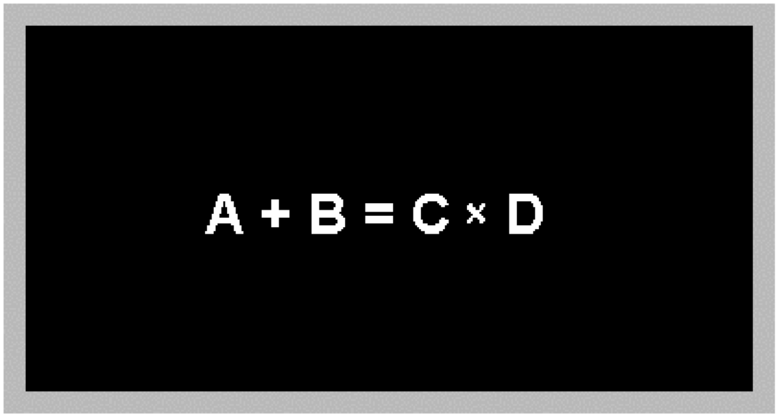
Let's look at a simple example to see how TK Solver works.

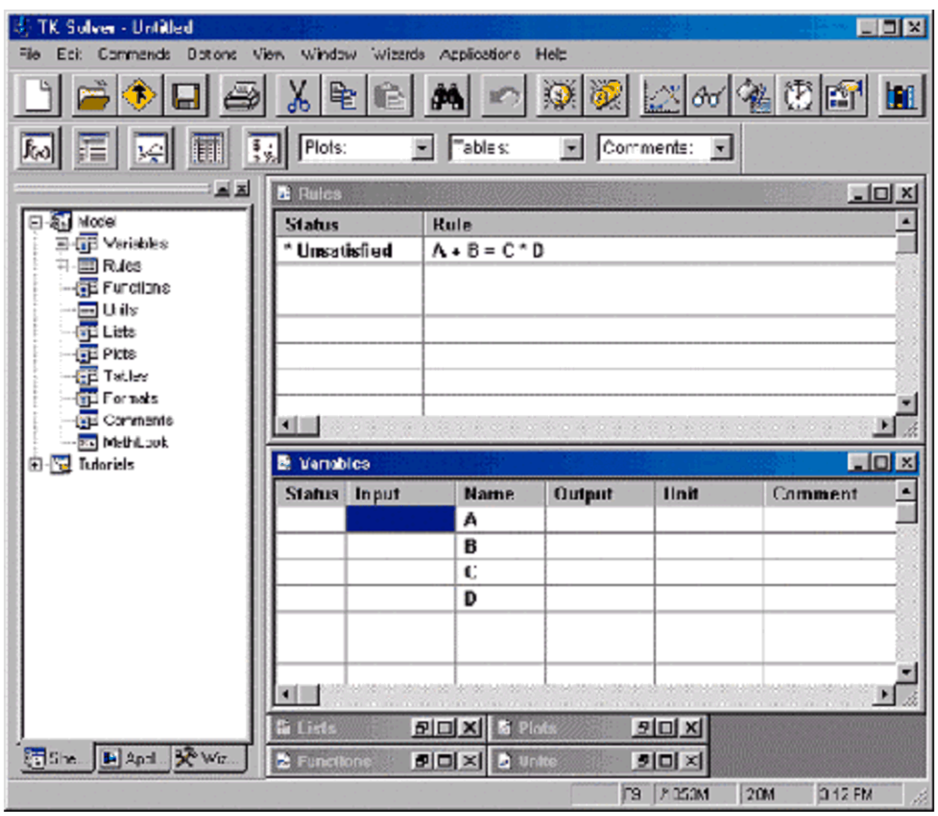


Think of any problem, simple or complex, as having two parts: the rules and the variables. A + B = C * D is a rule. (It might also be called a formula or an equation.) A, B, C and D are variables; they stand for numeric values.

A problem begins with rules and variables, and so does TK Solver: It begins with a Rule Sheet and a Variable Sheet.

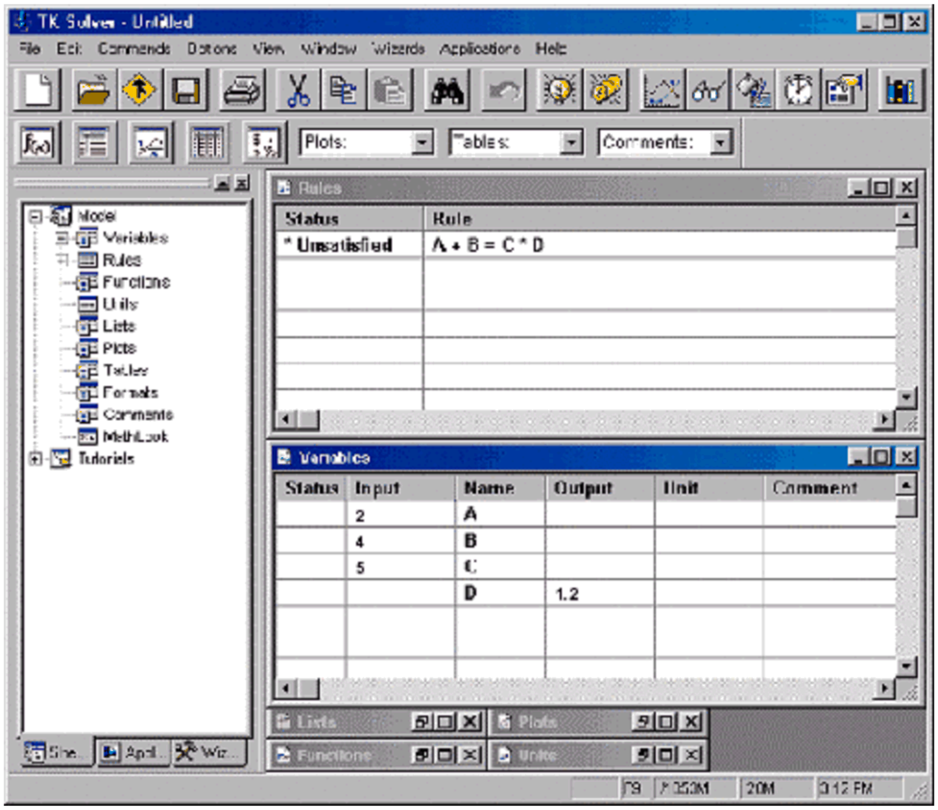
The Rule Sheet is just what it says. You put all your rules there. With TK Solver, you don't have to worry what order the rules are in. You don't have to isolate the variables; just enter them in a way that shows the relationships that the rule establishes. You might be solving for C, but you still enter A + B = C * D.

As shown below, when you put a rule on the Rule Sheet, the variables it contains are automatically placed on the Variable Sheet. Most of the business of the Variable Sheet is done in the columns for the variable names, Input values and Output values.



To solve a problem, enter the values you know. What if A is 2, B is 4, and C is 5? Put them in the Input column.

When you solve, the value of D appears in the Output column as shown below.



If the real ease of TK is in its sheet structure, the real power of TK is in something you don't see. TK uses not one, but two methods of solving a problem. And it can solve a problem forward or backward: it can "backsolve."

The Direct and Iterative Solvers

The **Direct Solver** uses the rules from the Rule Sheet along with the input values from the Variable Sheet to calculate output values for unknown variables.

Sometimes the **Direct Solver** cannot solve by simple substitution, inversion and evaluation. In this case, you can supply a "guess" value for the unknown variables. This "guess" value is used to give the **Iterative Solver** a starting point in finding an output for the variable. The **Iterative Solver** then "iterates," or repeats an operation, until it converges on a solution that satisfies all the equations in the Rule Sheet.

Backsolving

This is where the real power - you could even say magic - of TK Solver occurs. With TK you can solve a problem forward or backward. If you have a group of values and just want to know the outcome, you enter the values as Inputs and the solution appears as Outputs. But you can also go the other way: if you want a particular outcome, you enter those values as Inputs, and the values you need to reach that outcome appear as Outputs.

You can switch Inputs and Outputs instantly, and TK will solve the model either way. It's that quick and easy.

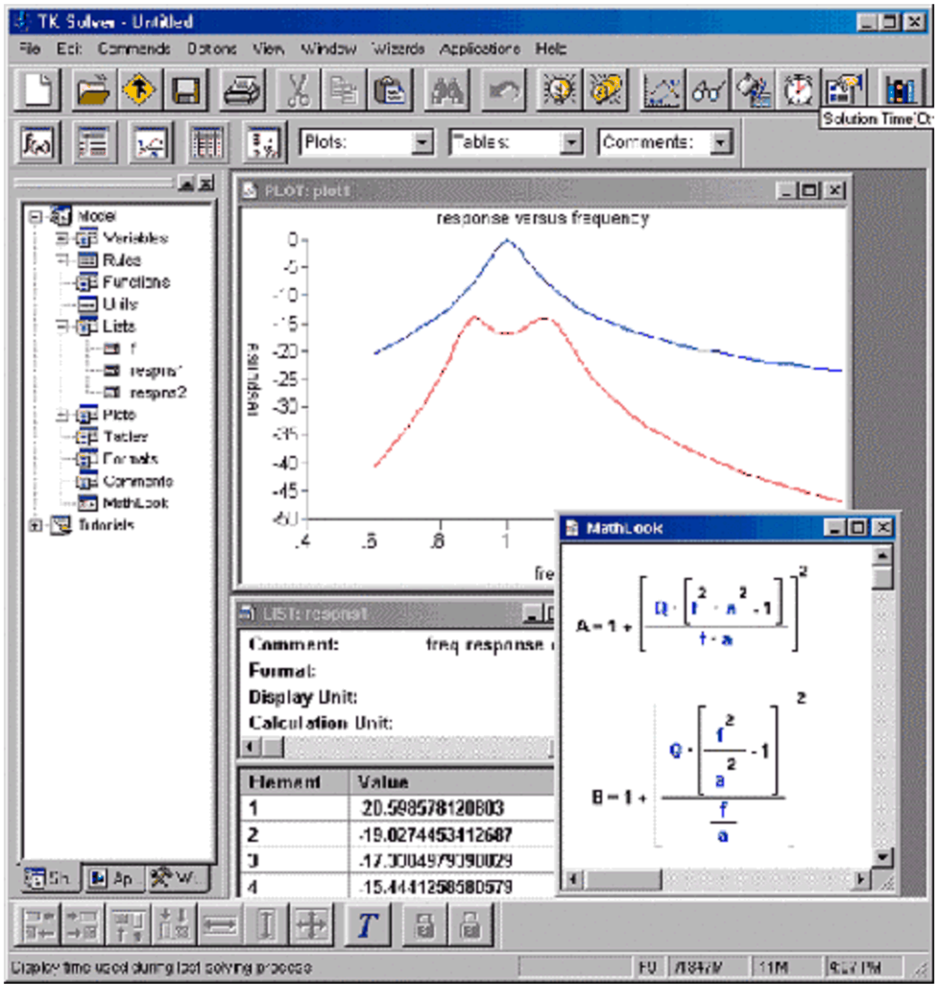
Of course, real world problem solving is a lot more complex than this. But the same process applies, whether it's one rule or 30,000. Type the equations in the Rule Sheet and enter the known values on the Variable Sheet.

But TK Solver doesn't stop there. Note the other icons on this screen. There are sheets for:

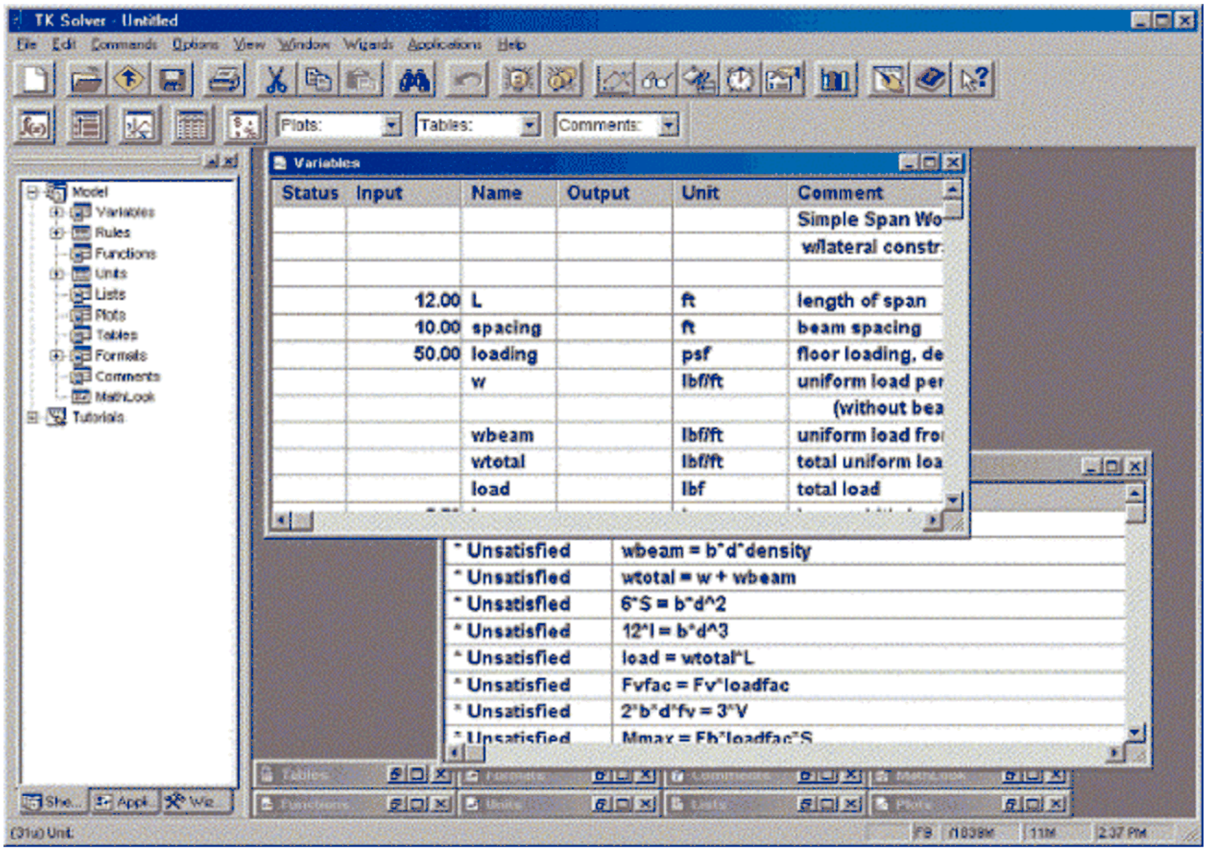
- Creating functions
- Generating data plots
- Entering tables of data
- Entering lists of values

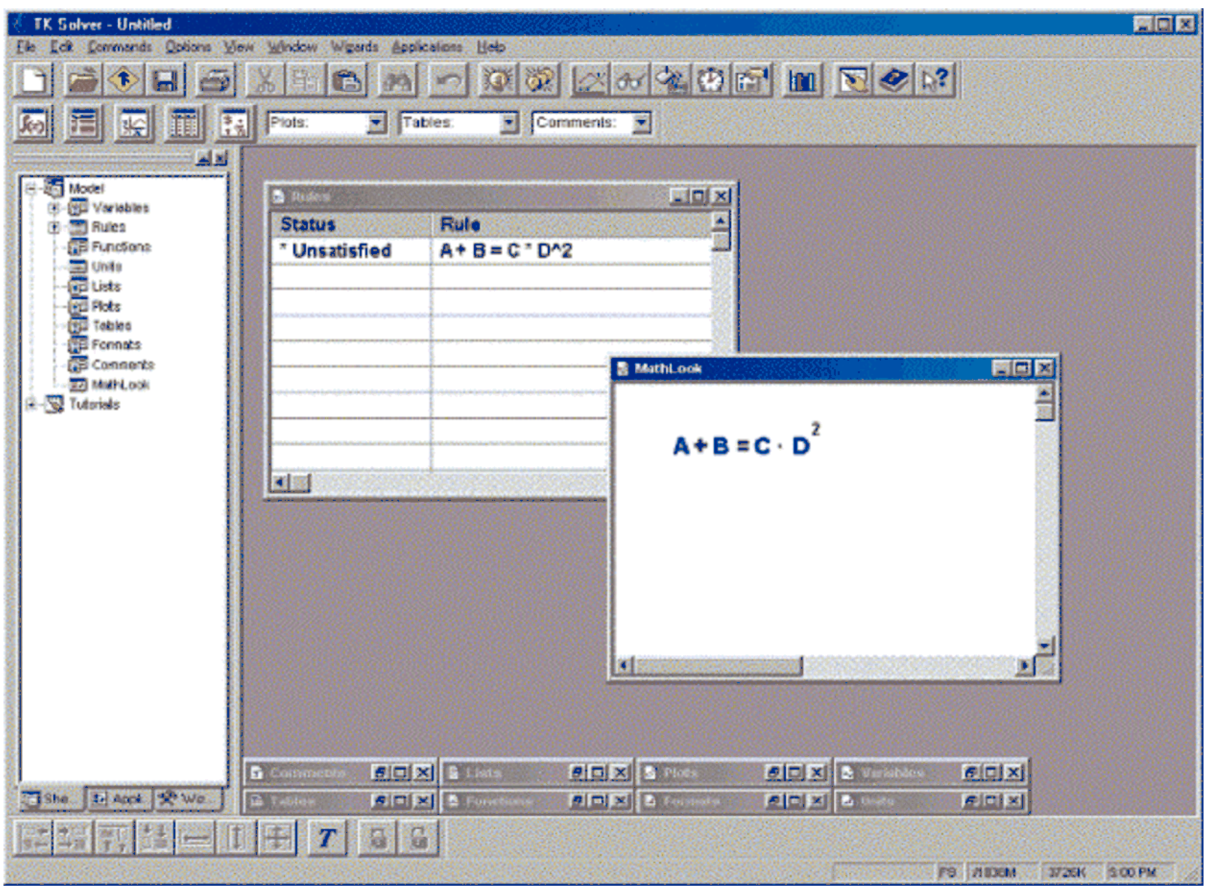
- Converting units
- Formatting your data
- Documenting your model

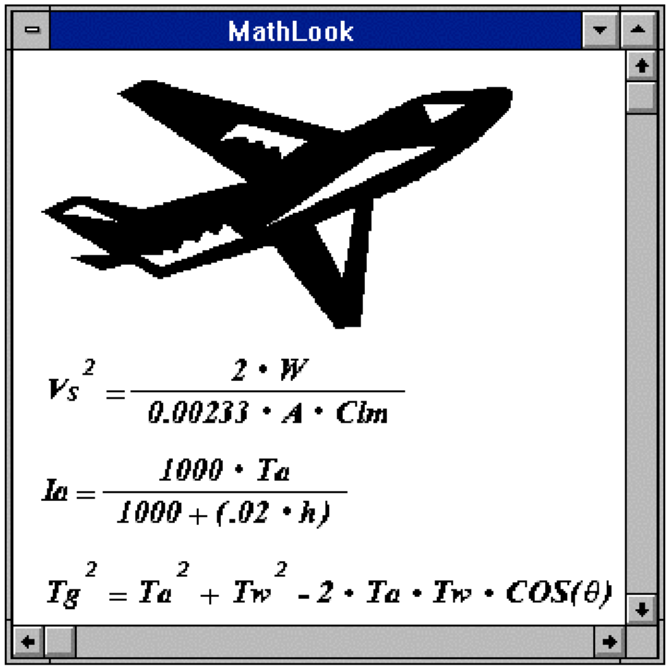
Everything you need is here to do complete problem solving and modeling.



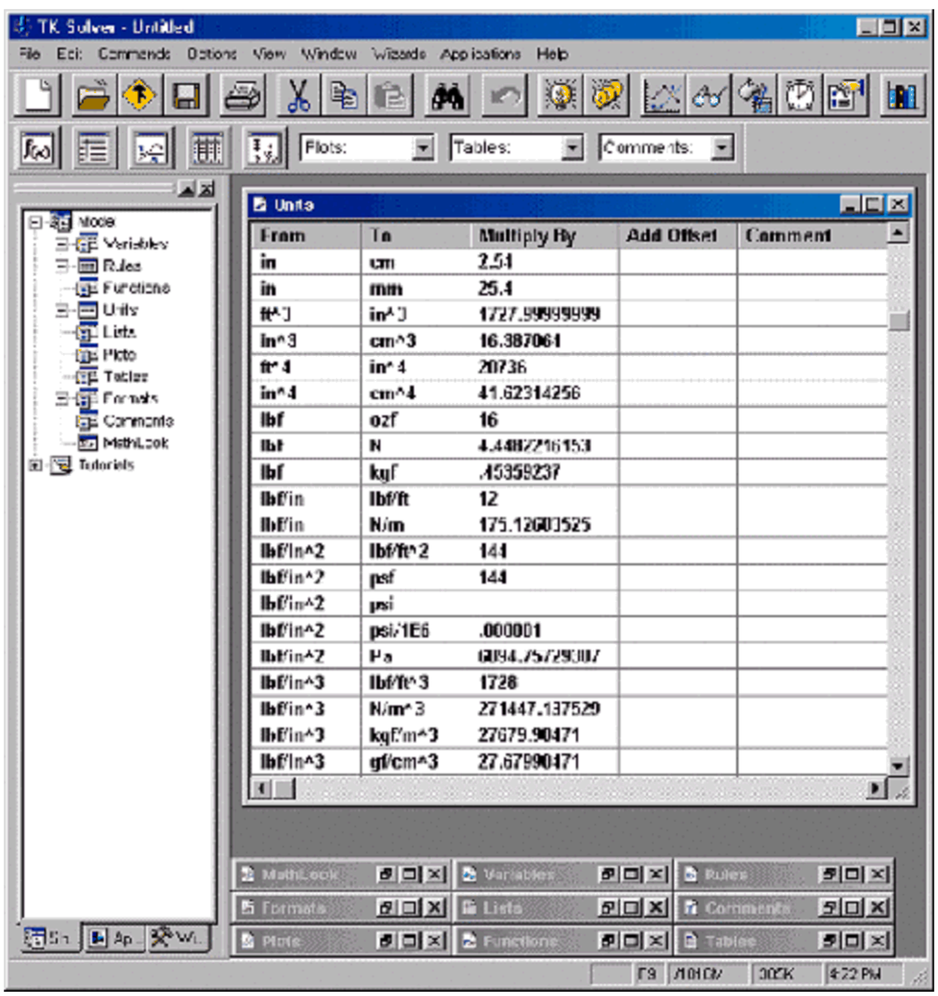
You can name variables and use the Comments column as shown in the example below to make your model self-documenting.


TK Solver - Untitled
File Edit Commands Options View Window Wizards Applications Help
Plots:
Tables:
Comments:
Model
Variables
Rules
Functions
Units
Lists
Plots
Tables
Formats
Comments
MathLook
Tutorials
Variables
Status Input Name Output Unit Comment
Simple Span Wo
w/lateral constr
12.00 L ft length of span
10.00 spacing ft beam spacing
50.00 loading psf floor loading, de
w lbf/ft uniform load per
(without bea
wbeam lbf/ft uniform load fro
wtotal lbf/ft total uniform loa
load lbf total load
* Unsatisfied wbeam = b*d*density
* Unsatisfied wtotal = w + wbeam
* Unsatisfied 6*S = b*d^2
* Unsatisfied 12*I = b*d^3
* Unsatisfied load = wtotal*L
* Unsatisfied Fvfac = Fv*loadfac
* Unsatisfied 2*b*d*fv = 3*V
* Unsatisfied Mmax = Fb*loadfac*S


TK Solver - Untitled
File Edit Commands Options View Window Wizards Applications Help
Plots:
Tables:
Comments:
Model
Variables
Rules
Functions
Units
Lists
Plots
Tables
Formats
Comments
MathLook
Tutorials
Rules
Status Rule
* Unsatisfied A + B = C * D^2
MathLook
A + B = C · D²

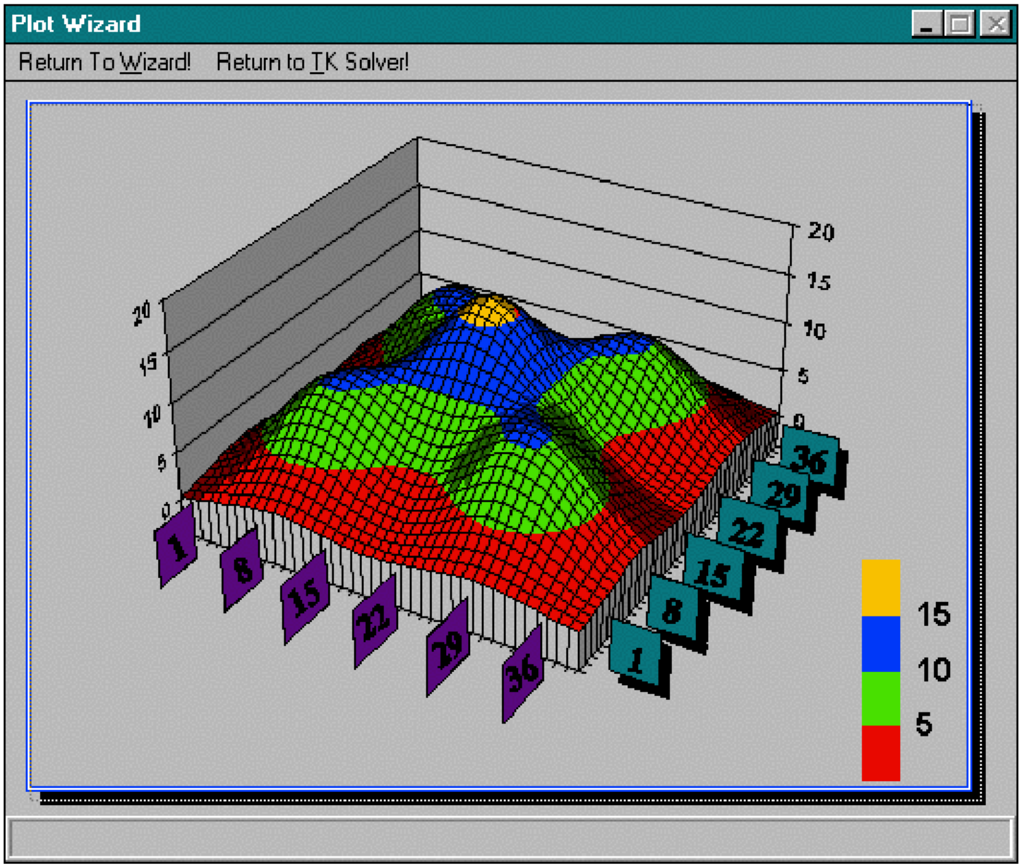


You can use the exclusive MathLook feature to create elegant displays of your problem, for monitor viewing or for printing in a report. Inserting bitmaps to the MathLook Sheet is the perfect place to store diagrams or pictures of the model's subject matter. Viewing rules in 2-D math notation is an excellent way of checking the validity of the rules entered in the Rule Sheet.

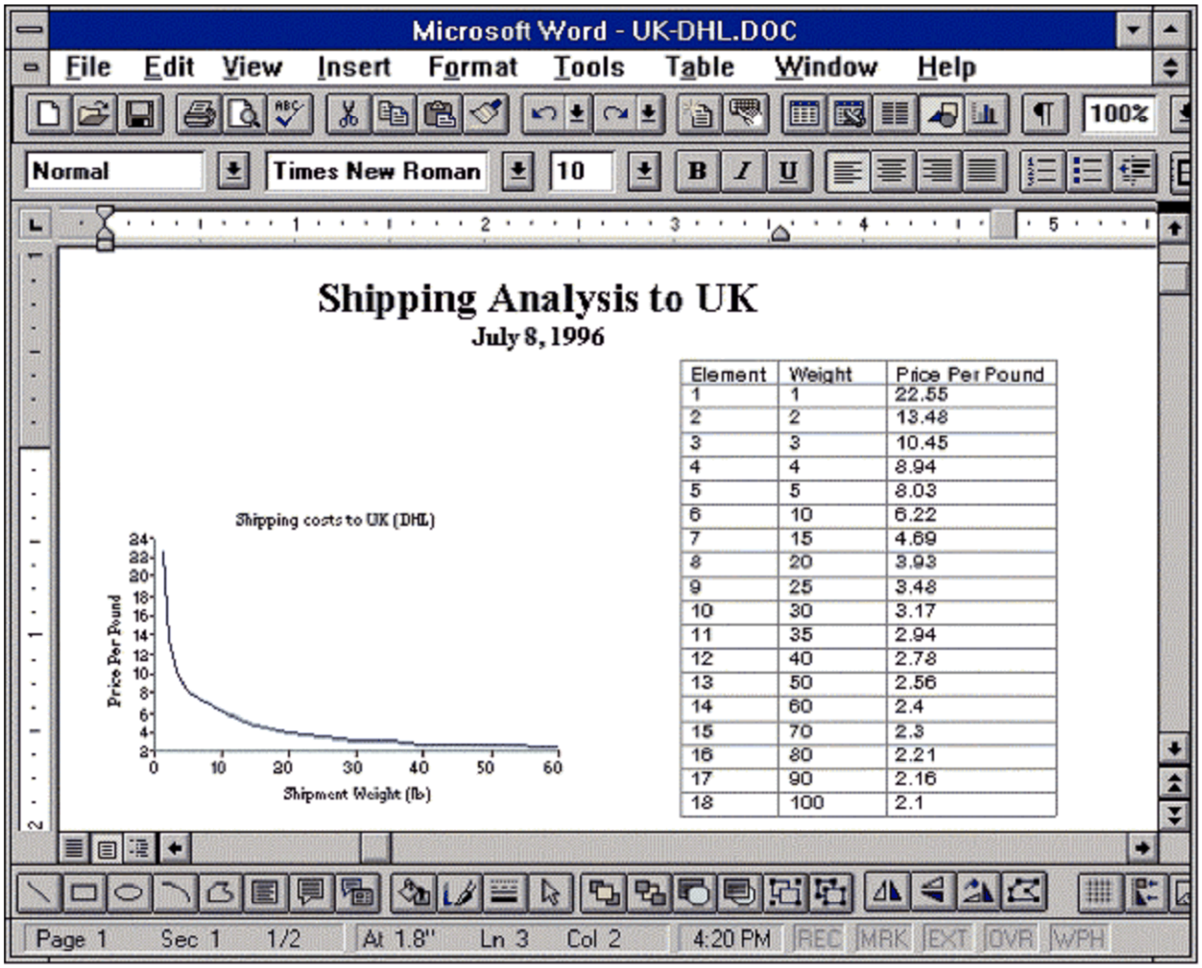


Just as you put all your rules for your problem on the Rule Sheet and all the variables on the Variable Sheet, you can put all your unit conversions in the Unit Sheet. You only have to state the conversion once in the Unit Sheet. Once a conversion is defined between two units, you can view your values in either measurement.

TK's presentation capabilities will help you write great reports.



TK Solver can generate a plot of any model. These examples show the range of capability and complexity, and highlight the presentation capability of TK Solver. The Plot Wizard makes it easy to choose just the kind of plot you want to illuminate your data and dress up your presentation.

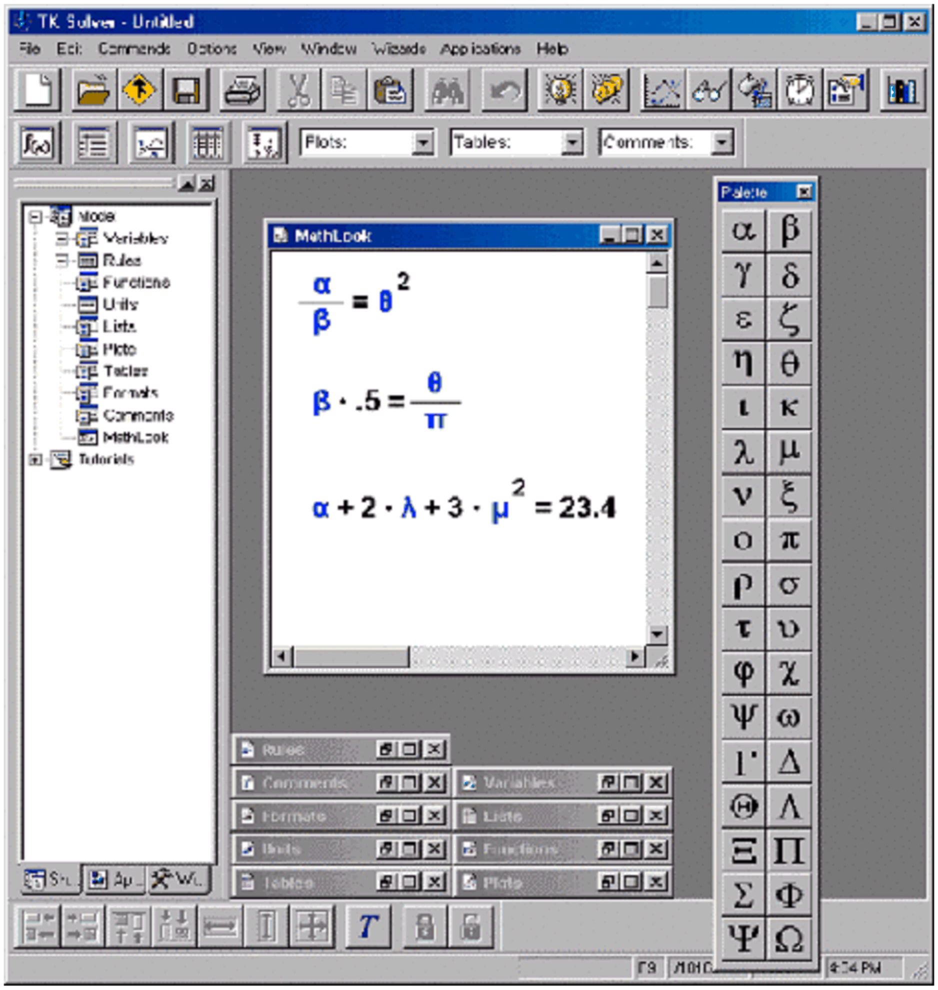


Element	Weight	Price Per Pound
1	1	22.55
2	2	13.48
3	3	10.45
4	4	8.94
5	5	8.03
6	10	6.22
7	15	4.69
8	20	3.93
9	25	3.48
10	30	3.17
11	35	2.94
12	40	2.78
13	50	2.56
14	60	2.4
15	70	2.3
16	80	2.21
17	90	2.16
18	100	2.1

Other wizards exist to help you perform tasks in TK. Here's an example of friction factors and fluid velocity for flow through pipes. We'll generate a plot using the List Solver Wizard. TK excels at complex math modeling like this!

You can also place TK Solver plots - or other TK results - in container documents like Microsoft Word and Excel. The TK objects are hot-linked to your TK model. Double- clicking the linked or embedded object opens the TK model for changes. Changes made in TK appear in the container document.

TK has many other features for displays and reports.



TK Solver has some other features to enhance the presentation of its results. We talked about MathLook. It lets you enhance the presentation of your calculations with different fonts and colors. There is also a Greek character palette. You can insert these characters into TK by clicking on the desired character on the Greek palette. This is ideal for keeping equations in original form.