# Profile Planner Instructions

**To use immediately**

**To get the most "Robust Profile" using the Bob Rooks Algorithm**
On the "Welcome Screen"
Click on "Plan a Profile"
Select an Oven to use (Orange)
Select a Paste to use (Yellow)
Click Finish
This takes you to the "Robust Profile Calculator Screen" where you can view your profile
**OR**
Go to Tab named "Robust Profile Calculator"
At the top on the left
Select the paste to use in the list box (Yellow)
Select the oven that you are using in the list box (Orange)
This takes you to the "Robust Profile Calculator Screen" where you can view your profile

**Ideal Profile** = The Profile that is generated using the Nominal Paste Specifications
**Robust Profile** = The "best fit" Profile that is generated using the selected Paste and Oven

**Nominal** = Are the average values or estimates based on the Paste Manufactures recommendations
These can be changed in the "Paste Specifications Screen"
**User Set** = The Nominal values can be overridden by the user
**Ideal** = These values are either the Nominal or User Set values if  the Nominal are overridden
**Robust** = These are the values calculated using the Paste Ideal values in the selected Oven

**What has happened**
All of the default values will be filled in and a robust profile will be generated
The graph at the right will show the profile generated using this paste and oven
It will include the liquidous line
The points mark the zone boundaries
The Triangles mark the Min - Max Ramp, Soak, and Spike Specification Boundaries for that paste
Time Above is the Min-Max Time Specification Boundary from the Ideal Peak Temperature
The suggested conveyor speed is shown on the graph
The "Cool" part of the chart is only representative of that part of the profile
The lower graph includes the Ideal and Most Robust profiles
The Ideal is the profile that is generate using the paste specifications and the total oven length
The Robust is the best profile generated in the selected oven using actual zone boundaries
The graph in the middle of this represents the oven zones and their size
All of these charts are aligned with each other for comparison

The goodness number below shows how close this number is to the ideal profile
The Oven dimension area at the bottom shows the zones in the oven selected and the size of each
zone
The values to the right of the white boxes (Nominal User Set) are the values being used to generate the profile
The values to the left (if show detail is turned on) shows the numbers generated for the Ideal and Robust Profile
**To change parameters**
Any white box can have data entered into it (Nominal User Set)
The system will use this data instead of the defaults
To clear user set parameters
Click on the "Clear" button (above Nominal User Set)
**To hide detail to the right of the Ideal Profile data**
Uncheck the box labeled "Show Detail"
**Printing**
Click on the button on the "Most Robust Profile" chart to print it
Click on the button, bottom middle, to print this page
**Web**
Clicking on www.ecd.com will take you to our web site


**Paste Specifications**
**To Add a Paste**
On the "Welcome Screen" or the "Paste Specification" Screen   Click on the "Add a Paste" button

This will lead you through a Wizard to add a new paste to the bottom of the paste list

    The actual addition of the paste to the database takes a moment

    Please enter data for all the parameters

    Ranges are suggested in the "Purpose" area of the Wizard

### To Delete or Edit a Paste

Select the cells one at a time and delete/edit  the data - it will not allow you to delete/edit the "Refrnc Nom" values

### Notes

The paste to be used can be selected in the list box (Yellow)

    Please note that this selection can be made in other screens also

The data for the paste being used is highlighted with a blue bar

You can edit the data directly for any paste by selecting the cell you want to change

The Nominal "Nom" values can be set for any paste.  The system will use these values instead of those suggested/calculated (Refrnc Nom) – this cell can be left blank if desired so you can tell when you have entered your own data

All Nom values can be reset to the "Refrnc Nom" values by clicking on the "reset all Ref Values" button

    **Note: this resets all of the pastes!**

The **Ambient** temperature used in this workbook is set on this sheet on the upper right

The graph shown represents the ideal profile of the selected paste

    You can click on the graph or the zoom button to see this enlarged

    This shows the "Ideal Profile" over time and is independent of any oven

    You can print this chart by clicking on "Print Chart"

    You can navigate back to the top by clicking on "Back to the Top"

## Oven Configurations

### To Add an Oven

On the "Welcome Screen" or the "Oven Configurations" Screen - Click on "Add an Oven"

This will lead you through a Wizard to add an Oven to the bottom of the Oven list

    All dimensions are in centimeters and only enter data for Heated Zones"

### To Delete or edit an Oven

Select the cells one at a time and delete/edit the data - it will not allow you to delete/edit the # of zones

### Notes

The oven being used can be selected in the list box (Orange)

    Please note that this selection can be made in other screens also

The data for the oven being used is highlighted with a blue bar

The chart shown is a dimensional visualization of the selected oven

You can edit the data directly for any oven by selecting the cell you want to change

All units are in centimeters

## To Change Ambient temperature

This is done in the "Paste Specification" Tab

Top area towards the right

The units are degrees C

## Welcome Screen

You can add Pastes, Ovens, or go directly to planning a profile from this screen

You can also navigate ECD's Web sites by selecting buttons to;

    ECD's Web site

    ECD's AutoM.O.L.E.® Web site

    ECD's AutoM.O.L.E.®Xpert Web site

    ECD's Catalog

    ECD's Software Downloads

    Links to Solder Paste Manufacturers

    Links to Oven Manufactures

    ECD's **PCBexpress** Web site for inexpensive "Quick Turn' Circuit Boards

    ECD's **PCBpro** Web site for Online quotes and ordering for most of you PCB needs!

## Robust Profile Chart

This is the same chart from the Robust Calculator Screen, only full size

## Bob Rooks Paper

You can see an abstract of the paper that "Profile Planner" is based on

**Table**

    This is used by the system only. Please do not modify in any way.

**Assumptions**

    **Units**

        All distances are in centimeters unless noted

        All temperatures are in degrees C

    **Pastes**

        All Reference values are the average of the upper and lower limits for a parameter or, if only one value, the parameter itself.  As noted, if there is a value in the "Nom" column then it will be used instead

    **Ovens**

        Only enter the heated zones.  The oven can have more zones for cooling.  This is assumed on the profile graph.

        The cool zone and slope are assumed to be the same size as the previous zone

    **Profile**

        Each oven will always have at least one ramp zone

    **Process**

        Using the machine-heated size and the Ideal values for the selected paste, an ideal profile is generated and the sizes for each profile parameter (ramp, soak, spike) are generated.

        The distance for each parameter is compared with the oven zone boundaries and a low and high zone is selected for the ramp and the spike.

            i.e..: if the ideal ramp would end between zone 2 and 3 then 2 and 3 would be the low and high values

        The same is done for the spike

        The distance error and the % error is then calculated

        If the error of the spike is more than minus 10%, it is thrown out

        The squares of the 3 error % values (ramp. soak, spike) are added to get a goodness #.

            The smallest error is then used to select the most robust process.

            The goodness number shown is actually the sum of the absolute error values subtracted from 100%

        Using the new boundaries for the parameters and the oven distances, the speed for each is calculated.

            To guarantee that the profile parameters will happen correctly, the min speed is selected for that profile.

            New slopes are then calculated for each parameter