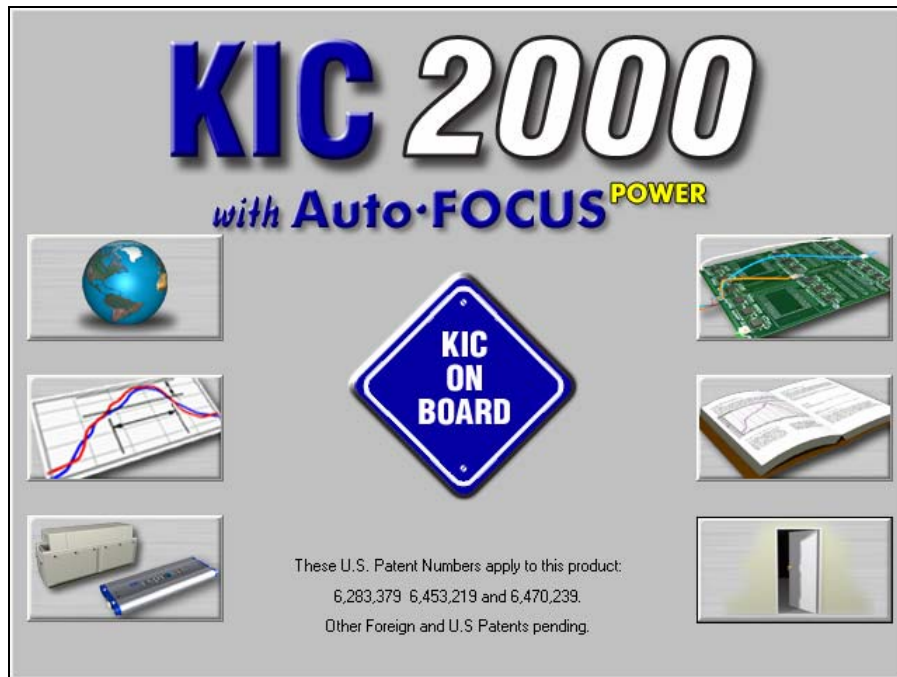

KIC 2000 User Manual

Hardware and Software



KIC 2000
with **Auto-FOCUS** **POWER**

KIC ON BOARD

These U.S. Patent Numbers apply to this product:
6,283,379 6,453,219 and 6,470,239.
Other Foreign and U.S. Patents pending.

The central graphic features a diamond-shaped sign with the text "KIC ON BOARD". Surrounding this sign are six small images: a globe, a circuit board, a line graph, an open book, a hardware component, and a vertical slot.

Ver.2.4.0.x



FCC Statement (Applies to KIC Explorers with RF capability only)

FCC ID: VBSKE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the users' authority to operate the equipment.

Party Responsible for Declaration of Conformity:

KIC

15950 Bernardo Center Dr, Suite E

San Diego, CA 92127

858 673 6050

FCC Statement (Applies to KIC Explorers Base Station)

FCC ID: VBSBS

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the users' authority to operate the equipment.

Party Responsible for Declaration of Conformity:

KIC

15950 Bernardo Center Dr, Suite E

San Diego, CA 92127

858 673 6050

KIC 2000 Hardware and Software User Manual

Copyright © KIC. All rights reserved. Patents pending.

15950 Bernardo Center Drive #E

San Diego, CA 92127 USA

Phone +1 858 673 6050 Fax +1 858 673 0085

A Division of Embedded Designs Inc.

8/27/2007

This document contains proprietary information protected by copyright, and this document and all accompanying hardware and software are copyrighted. All rights are reserved. Patents are pending. Specifications are subject to change without notice.

This document may not be sold. KIC hereby grants the user permission to duplicate, in part or in whole, this document for whatever purposes the user sees fit. No part of this document may be altered and redistributed by the user.

KIC and KIC Thermal Profiling are divisions of and registered trademarks and trade names of Embedded Designs Inc. Profiler, SlimKIC 2000, KICstart, WAVEstart, KIC Explorer, Base Station, KIC 24/7, KIC 24/7 Wave, KIC Navigator, KIC Auto-Focus, Power, KIC Vision, KIC RPM, KIC Server, Wave Surfer, Process Window Index, PWI, the Lead Free Capable symbol and the KIC logo are trademarks or registered trademarks of KIC. All other trademarks and trade names are the property of their respective holders and are hereby acknowledged.

Software Licensing Agreement and Product Warranty

The KIC 2000 Software is subject to the following license terms and conditions. Please read this license before you open the disk package. If you do not agree to the terms and conditions of this license you may return the software to KIC for a full refund.

1. KIC 2000 SOFTWARE LICENSE

- 1.1 This is a software license granted by KIC, mailing address 15950 Bernardo Center Dr. #E, San Diego, CA 92127. The KIC software is licensed to you as the end user, it is not sold.
- 1.2 The KIC 2000 software is copyrighted material. Once you have paid the license fee, you may use the software as long as you like provided you do not violate the copyright and if you follow these simple rules.
- 1.3 The KIC 2000 software is sold with one or more pieces of hardware called a TPU or a Thermal Transmitter. This License allows you to use the KIC 2000 software with the hardware purchased. You must pay for additional copies of the software if additional hardware is purchased. You may copy the software to as many computers as you like.
- 1.4 You may not make any changes or modifications to the licensed software, and you may not decompile, disassemble, or otherwise reverse engineer this software.

2. LIMITED WARRANTY

- 2.1 What is covered by the Warranties: KIC warrants that the Hardware, Software, and Documentation are free from defect in material and workmanship under normal use. KIC warrants that the system as a whole will perform substantially in accordance with the specifications set forth in the Documentation provided with it.
- 2.2 Warranty "rated temperature" clarification. Much of the KIC hardware is rated by KIC to perform up to a certain temperature. Any hardware that is determined by KIC to have been exposed to temperatures above its rated temperature will not be covered under this Warranty.
- 2.3 Start of the Warranty period. The Warranty period begins the day the KIC product is delivered to you as the first customer.

2.4 Obligations of KIC During The Warranty Period

- 2.4.1 Return for complete refund. Within the first thirty (30) days of the start of the Warranty KIC will refund any money paid and accept as payment in full for any money owed, the return of any hardware or software for any reason whatsoever, provided that returned product is in original condition.
- 2.4.2 Replacement. Within the first year of the start of the Warranty KIC will replace any product proves defective in materials or workmanship, without additional charge, on an exchange basis.
- 2.4.3 Correction of Software. KIC will either replace or repair without additional charge any software that does not perform in substantial accordance with the specifications of the Documentation. This will be done by delivering to you a corrected copy of the software or corrective code.
- 2.4.4 Final Remedy. If KIC is unable to replace defective documentation or defective media or if KIC is unable to provide a corrected copy of the software or corrected documentation within a reasonable time, KIC will either replace the software with a functionally similar program or refund the license fees paid for use of the software.

2.5 Exclusion of Other Warranties

- 2.5.1 KIC does not warrant that the functions contained in the software will meet your requirements or that the operation of the software will be uninterrupted or error free. The Warranty does not cover any copy of the software that has been altered or changed in any way by you or others. KIC is not responsible for problems caused by changes in the operating characteristics of the computer hardware or operation system which are made after delivery of the software.
- 2.5.2 KIC SHALL NOT IN ANY CASE BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER SIMILAR DAMAGES ARISING FROM ANY BREACH OF THESE WARRANTIES EVEN IF KIC THERMAL PROFILING OR ITS AGENT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations of exclusion may not apply to you.

2.6 Other Conditions

- 2.6.1 The warranties set forth above are in lieu of all other express and implied warranties, whether oral, written, or implied, and the remedies set forth above are your sole and exclusive remedies. Only an authorized officer of KIC may make modifications to this warranty, or additional warranties binding on KIC. Accordingly, additional statements such as advertising or presentations, whether oral or written, do not constitute warranties by KIC and should not be relied upon as such. This Warranty gives you specific legal rights, and you may also have other rights, which vary, from state to state.

3. LIMITATION OF LIABILITY

- 3.1 In no case shall KIC's liability exceed the license fees paid for the right to use the Licensed Software or One Hundred Dollars (\$100.00), whichever is greater.

Table of Contents

KIC 2000 HARDWARE AND SOFTWARE USER MANUAL.....	I
SOFTWARE LICENSING AGREEMENT AND PRODUCT WARRANTY	II
CONGRATULATIONS!.....	1
KIC'S THERMAL PROFILERS.....	1
THE KIC NAVIGATOR SOFTWARE OPTION.....	1
AUTO-FOCUS SOFTWARE OPTION.....	1
NAVIGATOR AND AUTO-FOCUS POWER SOFTWARE OPTIONS	1
INSTALLING THE KIC 2000 SOFTWARE.....	2
MINIMUM PC REQUIREMENTS	2
LANGUAGES.....	2
DIRECT OVEN COMMUNICATION.....	3
INSTALLING THE SOFTWARE KEY (OPTIONAL).....	3
KIC 2000 PROFILER HARDWARE	4
KIC PROFILER TECHNOLOGY.....	5
SLIMKIC 2000 HARDWARE	5
KIC EXPLORER HARDWARE	5
KIC 2000 OPTIONAL FEATURES.....	6
SLIMKIC 2000 HARDWARE CONFIGURATION	8
KIC EXPLORER HARDWARE CONFIGURATION	9
STARTING KIC 2000	15
QUICK-START PROFILE CHECKLIST	16
GLOBAL PREFERENCES	18
GLOBAL TAB	18
AUTO FOCUS TAB.....	20
PROCESS WINDOW SETUP	21
SOLDER PASTE MENU	22
EDIT SPECS	23
SEPARATE SPECS	24
SAVING - PROCESS WINDOW	25
HARDWARE STATUS.....	26
RUN A PROFILE.....	27
AUTO-FOCUS, PRODUCT DIMENSIONS.....	28
AUTO-FOCUS, CONFIRM	28
ENTERING OVEN RECIPE	31
INSTRUCTIONS ON ATTACHING TC'S	33
SELECT THERMOCOUPLES AND START PROFILE	35
STARTING THE PROFILE.....	36
LIVE PROFILE GRAPH DISPLAY.....	38
VIEWING THE PROFILE AND STATISTICS.....	40
PROFILE OPTIMIZATION WITH THE KIC NAVIGATOR OPTION.....	41
MANUAL PROFILE PREDICTION.....	42
PROFILE GRAPH DISPLAY	43
KIC 2000 PROFILE EXPLORER	48
INSERTING KIC 2000 DATA FILES FROM AN OUTSIDE SOURCE	49
PRINTING.....	50
PRINT FORMAT #1	50

PRINT FORMAT #2.....	51
CHANGING PRINT FORMATS.....	52
WAVE SOLDER PROFILING.....	53
KIC 2000 SOFTWARE WAVE SOLDER PROFILING.....	54
RUNNING A WAVE SOLDER PROFILE.....	55
LIVE PROFILE GRAPH DISPLAY.....	63
PROFILE GRAPH DISPLAY.....	65
CURE PROFILING.....	81
NAME PRODUCT AND SELECT PROCESS WINDOW/APPLICATION TYPE.....	81
TEMPERATURE VS. TIME PROFILING.....	82
SAMPLE RATE.....	82
KIC 2000 SOFTWARE.....	82
PROCESS WINDOW SETUP.....	83
RUNNING A TEMPERATURE VS. TIME PROFILE.....	84
LIVE PROFILE GRAPH DISPLAY.....	87
VIEWING THE PROFILE AND STATISTICS.....	88
AUTOMATIC CALCULATION OF DELTA T + DELTA (OR RANGE) FOR ALL STATS.....	90
POINTER TOOL.....	90
PROFILE SCREEN BUTTONS.....	90
EXITING THE PROFILE SCREEN.....	91
KIC PROFILERS.....	92
SLIMKIC 2000.....	92
SLIMKIC 2000 CALIBRATION.....	94
KIC EXPLORER.....	96
KIC EXPLORER CALIBRATION.....	106
APPENDIX A: THE PROCESS WINDOW INDEX.....	113
THE PROBLEM.....	113
DEFINING THE PROCESS WINDOW INDEX.....	113
CALCULATING THE PWI.....	114
BENEFITS OF RANKING THERMAL PROFILE PERFORMANCE.....	114
CONCLUSION.....	115
APPENDIX B: ATTACHING THERMOCOUPLES TO THE PRODUCT.....	116
OVERVIEW.....	116
ALUMINUM TAPE.....	116
HIGH TEMPERATURE SOLDER.....	117
APPENDIX C: WRITING KIC 2000 DATA OVER A NETWORK.....	118
CONTACTING KIC.....	120
KIC USA.....	120
KIC INTERNATIONAL SALES – EUROPEAN OFFICE.....	120
KIC INTERNATIONAL SALES – SINGAPORE OFFICE.....	120
KIC INTERNATIONAL SALES – CHINA OFFICE.....	120
ON THE WEB.....	120
KIC TECHNICAL SUPPORT.....	120
KIC PRODUCT TRAINING.....	120
KIC SALES.....	120
FIND THE KIC REPRESENTATIVE IN YOUR AREA.....	120

Congratulations!

You have the world's most sophisticated thermal profilers at your service!

KIC's Thermal Profilers

The SlimKIC 2000 and KIC Explorer are real-time solder reflow process setup and optimization tools. They feature a more robust hardware configuration than any other profilers on the market. The KIC Profilers configuration guarantees a perfect profile every time by both transmitting data in real-time as it passes through the process and simultaneously recording the data internally. When the KIC Profiler has completed its run through the process, the internally logged profile is automatically wirelessly downloaded, filling in any gaps that may have occurred due to broken transmission of the real-time profile. The wireless download feature ensures that every profile run is a good one, and that it will never be necessary to hold up production to run a second profile.

The KIC 2000 software features minimal initial setup and a radically simplified operator interface that eliminates tedious board mapping and oven measuring. The software is designed to be completely intuitive and require very little training. It comes with an updateable database of hundreds of popular solder pastes, which allows you to automatically select the specs for the paste you're using. A series of screens with clear explanatory graphics guides you through the profiling process from beginning to end, and if the profiling is being done with one of the selected ovens that communicate with the KIC software, the software automatically changes the oven set points to your profile.

The KIC Navigator Software Option

The KIC *Navigator* is significantly improved automated prediction tool which allows you to predict how changes to belt speed and oven set points will affect a product profile. **The KIC Navigator can create and evaluate billions of potential product profiles, automatically selecting the profile and oven setup that best fits the Process Window.** This automated prediction tool is exponentially more powerful and accurate than any tool currently on the market and allows you to find the optimal profile in about a minute. The automated prediction tool is designed to center the profile in your process window, and you may set the limits to fit your process.

Perhaps the most significant feature of the *KIC 2000* and the *KIC Navigator* is that it ranks your profiles using the *Process Window Index*. This allows you to compare performance between processes and, more importantly, to be assured that you have found the most robust and reliable profile for a given product that your oven can achieve.

If you didn't order the KIC Navigator with your KIC Profiler, be sure to ask your KIC Representative for a demonstration of this breakthrough technology.

Auto-Focus Software Option

The KIC *Auto-Focus* is a computer simulation software option available for the *KIC 2000* software. This option eliminates the need to "guess" at an initial oven recipe; instead *Auto-Focus* calculates the ideal oven recipe allowing you to avoid conventional oven setup pitfalls. *Auto-Focus* gets smarter with every profile you run, providing you with increasingly accurate oven recipes.

Navigator and Auto-Focus Power Software Options

The *Power* option optimizes your profiles based on reduced energy usage. Studies have shown that many reflow ovens and wave machines consume more energy than required in order to process the products in spec. The *KIC Navigator* and *Auto-Focus* "Power" options identify the oven or wave solder recipes that consume the least amount of energy while processing the products in spec. The end result is improved quality at reduced energy costs.

It's recommended to read this manual entirely before attempting to run profiles of any *Application* type.

Installing the KIC 2000 Software

Minimum PC Requirements

- 800 MHz processor / 256Mb RAM
- 2Gb available storage (for Product history records)
- SVGA video 1024x768 resolution, 16-bit
- 1 or more available USB ports (KIC Profiler and or Software key)
- Operating system: Microsoft® Windows® 2000, XP

Languages

The *KIC 2000* software supports the following languages:

English	Japanese
German	Korean
Spanish	Simplified Chinese
	Traditional Chinese

Some of the supported languages can only be used with their respective operating systems:

- Japanese, Korean, Simplified Chinese, and Traditional Chinese can not be used with English versions of Windows operating systems.
- To run *KIC 2000* in Japanese, the operating system must be Windows-Japanese version. To run *KIC 2000* in Simplified or Traditional Chinese, the operating system must be Windows-Chinese version.
- English, German, and Spanish can be run on any of the supported Windows operating systems.

To install the software, perform the following steps:

- Insert the KIC 2000 CD into your CR-ROM drive.
- The KIC 2000 installation will automatically start.
- If the KIC 2000 software does not auto-start, go to **Windows Start Menu** and click on **Run**.
- Type **D:\setup** (or your CD-ROM drive letter) and press the **Enter** key on the keyboard.
- Follow the instructions for the installation program as the screens are updated.

If you have question regarding your hardware or software configuration contact KIC Tech Support.

Direct Oven Communication

The *KIC 2000* can interface directly with the oven controller on selected models from leading reflow oven manufacturers. The *KIC 2000* software can load oven recipes as well as zone temperature setpoints and automatically send these setpoints to the oven, eliminating the need for separate data entry.

Below are the oven manufactures that *KIC 2000* is capable of interfacing with:

- BTU
- Electrovert
- Heller
- JT
- Seho
- Vitronics

Installing the Software Key (optional)

If you have purchased any software options, you will have to install a software key. The software key will be installed in the computers parallel or USB port, so you may have to temporarily remove your printer cable to install the software key. To install the software key, follow these steps:

- Power off the computer and the printer.
- Remove the printer cable currently connected to the parallel port (if necessary).
- Firmly attach the male end of the software key to the computer parallel port, tighten the thumbscrews or If using a USB software key connect it to any open USB port.
- Firmly attach the printer cable to the female end of the software key, tighten the thumbscrews (Parallel).
- Apply power to the computer and the printer.
- Functionally check that the Software Key is working properly. Open the *KIC 2000* software and select the “Hardware Status” button. If it does not say “Software key successfully installed”, then there may be a problem with your parallel port, the software key, or the *KIC 2000 software* installation did not successfully install the drivers for the software key. Contact *KIC* tech support for assistance.

If you received a parallel port software key, and your computer does not support that type of connection, contact KIC and an alternate USB-software key can be sent as a replacement.

To check that the Software Key is properly working, start the *KIC 2000* software. The main screen should say *KIC 2000* with *Navigator*. If it does not display “*with Navigator*”, or “*with Auto-Focus*” then there may be a problem with your parallel or USB port, the software key, or the *KIC 2000* installation did not successfully install the drivers for the software key. Contact *KIC* tech support for assistance, tech@kicmail.com.

If you have purchased the *Power* option(s); The *KIC 2000 Main Menu* should say “with **NAVIGATOR Power**” if you purchased only the *Navigator* and *Power* options, and “with **Auto-Focus Power**” if you have purchased the *Auto-Focus* and *Power* options or the *Auto-Focus*, *Navigator* and *Power* options.

KIC 2000 Profiler Hardware

The *KIC 2000* software can be used with 2 different *KIC* profilers the *SlimKIC 2000* and the *KIC Explorer*.

The *KIC 2000* software is designed to operate the same regardless of what profiler is being used. Upon software installation the user selects the *KIC* profiler that they are using. Then the software will depict profiler-model specific text and artwork for your *KIC* profiler.

The *KIC 2000* profiler comes standard with 9 thermocouple channels, 12 channels optional, and is available as a Data Logger, or *RF* model. Available accessories include *Wave Surfer*, *KIC Carrier*, and various thermal shields. See the *SlimKIC 2000* section for more information, page 92.



Figure 1: Example SlimKIC 2000 product kit

The *KIC Explorer* comes with your choice of 12 or 7 channels models. As a standard feature, the *KIC Explorer* has 12 thermocouple inputs. The miniature-TC harness design makes this possible. If you prefer to use Type-K thermocouples, the *KIC Explorer* is available in a standard Type-K, 7-channel model as well. See the *KIC Explorer* section for more information, page 96.



Figure 2: Example KIC Explorer 12 Channel product kit

Both the 12 and 7 channel *KIC Explorer* models can be used as a data logger and with the additional RF hardware they can both communicate wirelessly with the *KIC 2000* software.

Throughout this user manual both *KIC* Profilers will be discussed. Where applicable the differences between *KIC* Profilers and there features will be outlined.

KIC Profiler Technology

The *KIC Profiler* uses different technology to complete its task of running profiles. The main difference between it and other profilers is the following:

- **Air thermocouple** – For all profiles run with the *KIC 2000* software the thermocouple plugged into the first channel on the *SlimKIC 2000* or *KIC Explorer* must be the *Air TC*. This TC is positioned 1-inch in front of the leading edge of the board for all profiles run using *KIC 2000* software.
- **Trigger temperatures** – KIC Profilers use trigger temperatures to start and stop the profile. The Start temperature is defaulted to 5 degrees above the Maximum Product Start temperature. *See Global Preferences for this setting.*
- **Hardware Monitor** - The combination of the *KIC Profiler* and the *KIC 2000* software closely monitors the *KIC Profilers* battery, internal temperature and the product temperature even before you start a profile. There are built-in checks in the software to insure that the product and *KIC Profiler* are cool enough and battery voltage sufficient to complete a profile safely. As well it will offer troubleshooting suggestions if there is a problem with communication or thermocouple attachment.
- **Perfect Data** – Through patent pending technology the *SlimKIC 2000* is able to get you perfect data every time. At the completion of a profile the *SlimKIC 2000* retransmits the data it has stored in its memory. This insures the integrity of the data, especially if there were any interruptions in the transmission during the profile.

SlimKIC 2000 Hardware

Inventory

Part Description	KIC Part Number
SlimKIC 2000 Transmitter or Data logger (9 or 12 channel)	SL2K-4-T/D-09 (12)
SlimKIC 2000 Receiver with antenna (for transmit version only)	RE2K-4
Communication Cable	CB-RS232-06P
Power Supply (for transmit version only)	PS
Thermal Shield	TS-SL-18
Individual Color Coded Thermocouples (9 or 12)	TC-TK-09-36
Aluminum Tape and Hi-temp Solder for attaching Thermocouples	TAPE
SlimKIC 2000 User Manual	MAN-SL2K
KIC 2000 software	SW-KIC 2000
Optional Software key (Example: Navigator , Auto-Focus)	NAV, NAV-AF

KIC Explorer Hardware

Inventory

Part Description	KIC Part Number
KIC Explorer Transmitter or Data logger (7 or 12 channel)	KE-DL-09 (4)-12 (7)
KIC Explorer Base Station RF Transceiver and antenna	REKE-9 (4)
USB Communication Cable	CB-KE-DWNLD-06
USB Extension cable 6ft (RF models Only)	CBKE-06EXT
Thermal Shield, Stainless Steel, Cool Touch	TS-KE-SS-PYR-12 (07)
Thermocouples (7 or 12)	TC-TKM-07 (12)
Aluminum Tape and Hi-temp Solder for attaching Thermocouples	TAPE
KIC 2000 User Manual	MAN-SL2K
KIC 2000 software	SW-KIC 2000
Optional Software key (Example: Navigator , Auto-Focus)	NAV, NAV-AF

KIC 2000 Optional Features

Software

- **Navigator** Software key – Activates the *Navigator* software option which automatically finds the optimal oven setup for each product you profile.
- **Auto-Focus** Software key –Option which calculates the ideal initial oven recipe allowing you to avoid conventional oven setup pitfalls.
- **Power** Software key - Optional feature for use with *Navigator* and/or *Auto-Focus* options. *Power* optimizes your profiles and/or initial oven settings based on reduced energy savings.

Hardware

- **Wave Surfer** – SlimKIC 2000 accessory that measures the performance of the wave solder machine each a pass is made.
- **Lead Free Thermal Shield** – Optional thermal shield used with the SlimKIC 2000 for elevated process temperatures associated with Lead Free thermal processes.
- **Higher rated Thermocouples** – KIC offers thermocouples rated for use up to 400°C. Standard KIC thermocouples are rated to 300°C.
- **KIC Carrier** – Optional accessory for the SlimKIC 2000 that carries the SlimKIC through the oven. Used when no belt conveyor is present.

Installing or Changing the Battery in your KIC Profiler

SlimKIC 2000:



Figure 3



Figure 4

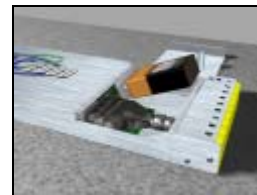


Figure 5

To install or change the battery or for calibration of the *SlimKIC 2000* profiler you will have to unscrew the battery cover from the bottom side of the *SlimKIC 2000*. This will require a small Flathead screwdriver. See Figure 3. The screw has a retaining clip to keep it in place so it will not come all the way out. Just loosen it enough so the cover comes free. See Figure 4. Remove the battery cover. See Figure 5.

There is a white connector for a 9-volt battery. Once you have connected the battery, slip the battery back in, placing the connector end in first. Then replace the cover and tighten the *Battery* cover. See the *SlimKIC 2000* hardware section of this manual for calibration details, page 94.

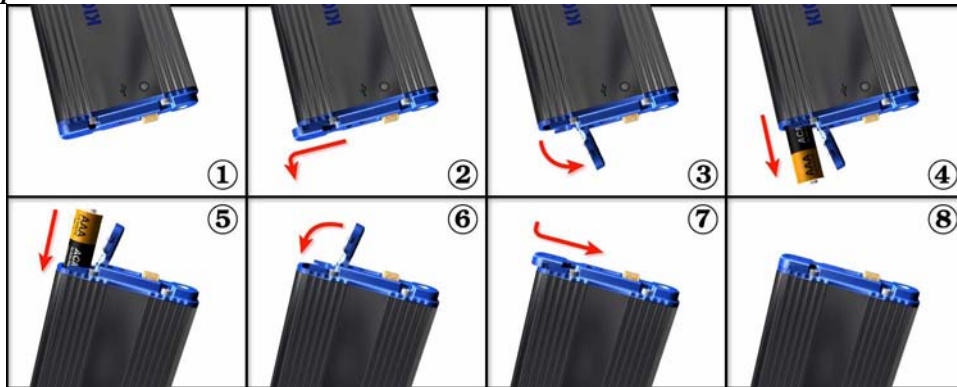
KIC Explorer:

Figure 6: KIC Explorer Battery install/replacement

The *KIC Explorer* uses 3 standard alkaline AAA sized batteries. *KIC* recommends the use of standard alkaline batteries; however you can use other types including rechargeable batteries.

If you experience negative effects using other types of batteries or discover your *KIC Explorer* is not operating properly, then switch back to standard alkaline batteries. If problems persist, contact *KIC* Technical Support: tech@kicmail.com.

Battery Life

The *KIC Explorer* is very efficient on battery usage. Independent tests show that a standard set of alkaline batteries will last more than 25 hours while operating at room temperature. Operating temperatures can affect battery performance.

Batteries and Temperature

The *KIC Explorer* is designed to pass through ovens that will cause the batteries inside the *KIC Explorer* to heat up. Since the batteries have a high heat capacity they will tend to continue to heat even after the *KIC Explorer* has exited the oven.

Even if the *KIC Explorer* has cooled sufficiently to allow the user to run another profile, the battery may not have cooled down as low as the *KIC Explorer*.

In the event the *KIC Explorer* batteries become heated during use and you wish to run another profile, *KIC* suggests substituting a different (room temperature) cooler set of batteries before the next profile is run. This will allow the user to run more frequent profiles without the chance of overheating the batteries or the *KIC Explorer*.

Note:

- Lead-Free (hot) thermal profiles can cause the battery packaging to un-wrap. This is normal and should be monitored to ensure the batteries condition is intact and operational before each use.
- In the event the batteries become heat damaged or corrosive, replace them immediately. Failing to do so can lead to *KIC Explorer* damage and or personal injury.

KIC Explorer Power On/Off

Power On – Press/hold the Amber colored On/Off button for 1 second (located at the back of the *KIC Explorer*). When power is on, the LED indicators will power on. The LED color/pattern will represent the current *KIC Explorer* hardware state/status. See Figure #158.

Power Off – Press/hold the Amber colored On/Off button for 1 second (located at the back of the *KIC Explorer*). See Figure #158. When the power is turned off, the LED indicators will be off.

SlimKIC 2000 Hardware Configuration

1. Install the KIC 2000 Software.
2. Connect the SlimKIC 2000 hardware to the computer (RS-232 Serial COM port)
3. Run KIC 2000 Software

If you have any questions or need assistance connecting your *KIC* hardware contact *KIC* Technical Support tech@kicmail.com.

The *SlimKIC 2000* profiler connects to the computer through a RS-232 serial port. All necessary software drivers will be installed during the KIC 2000 software installation. In the event that the computer has no RS-232 COM ports or none are available, a Serial-USB adapter is required.

RF Mode

The *SlimKIC 2000 - Receiver* is plugged into the COM port on the PC and the power supply is plugged into the small jack on the cable and into a power source. To initialize the *SlimKIC 2000* plug the *Receiver Cable* directly into the *SlimKIC 2000*. See Figure 7.

Temperature vs. Time profiles must be run with the communication cable connected throughout the profile, even for *SlimKIC 2000's* with transmit capability.



Figure 7

Data log Mode

The *SlimKIC 2000 - Data logger* version will be plugged in directly from the PC COM port. **No Receiver or power supply will be included in your data logger version.** See Figure 8.

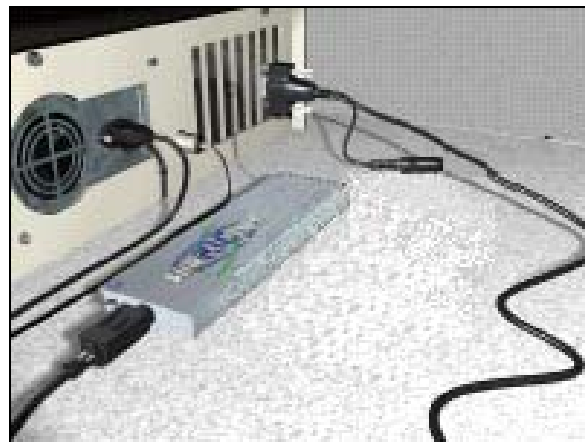


Figure 8

KIC Explorer Hardware Configuration

Important: You must install the KIC 2000 software before connecting your KIC Explorer to the computer.

Failing to install the *KIC 2000* software prior to connecting your *KIC Explorer* to the computer will render the *KIC Explorer* unusable.

1. Install the KIC 2000 Software.
2. Connect the KIC Explorer hardware to the computer.
3. Install USB drivers

If you have any questions or need assistance connecting your KIC hardware contact KIC Technical Support tech@kicmail.com.

RF Mode

The *KIC Explorer* can communicate wirelessly with your *KIC 2000* software on your computer. Wireless (RF) communication gives the user the ability to view the profile in real-time. All *KIC Explorers* can be used in *RF* mode.

Note: The *KIC Explorer Base Station* is needed to activate the *RF* function.

The *KIC Explorer Base Station* connects to the USB extension cable and the cable is connected to a USB port on the computer. See Figure 9 and Figure 10. A USB extension cable is used to allow positioning for best reception. Connect the *Base Station* and *KIC Explorer* antennas. See Figure 11 and Figure 12.

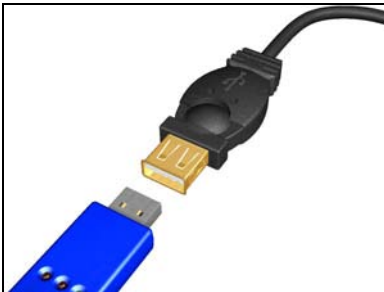


Figure 9



Figure 10



Figure 11

Note: For Best results; when selecting a USB port for your *KIC Explorer* or *KIC Explorer Base Station*, *KIC* suggests utilizing a port that is in the back of the computer—connected to the main board. These USB ports are better grounded than front-USB ports.

A 6-foot USB port extension cable is included with your *KIC Explorer* so that the user can place the *Base Station* in a viewable location and remain connected to the rear USB ports.

By connecting the Base Station and KIC Explorer antenna the KIC Explorer device becomes an intentional radiator of RF. See page 96.



Figure 12

Data Log Mode

The standard mode of communication for the KIC Explorer is Data Log mode. The KIC Explorer USB communication cable is used to transfer data to and from the KIC 2000 software computer from your KIC Explorer. For Firmware upgrades, Data Log mode is required.

Connect the KIC Explorer USB communication cable to the computer. See Figure 13.



Figure 13

Connect the other end of the KIC Explorer communication cable to the KIC Explorer. See Figure 14.



Figure 14

The KIC Explorer is now connected to the computer via USB cable. See Figure 15.



Figure 15

Note: When connecting the *KIC Explorer* to laptop computers that utilize a floating ground connection (2-prong power plug), the user will be required to manually ground the laptop prior to connecting the *KIC Explorer*. This procedure will prevent unwanted electrical interference that may distort the temperature data collected by the *KIC Explorer*. Contact KIC Technical Support for assistance, tech@kicmail.com.

Connecting your KIC Explorer to the Computer

Important: You must install the KIC 2000 software before connecting your KIC Explorer to the computer.

The *KIC Explorer* communicates through the USB port on the computer. Depending on your model *KIC Explorer* you will connect either the *KIC Explorer* communication cable or the *KIC Explorer Base Station* to your computers USB port.

In the event that there are no available USB ports, a standard 2-8 port USB-hub can be used to add more USB ports to the computer.

After successful *KIC 2000* software installation and installation of the batteries you are ready to connect your *KIC Explorer* hardware to your computer. Turn the power on by pressing the on button.

1. Turn on the *KIC Explorer*.
2. Connect the USB communication cable to the *KIC Explorer* and the other end to the computers USB port. If the *KIC Explorer* has the optional *RF* hardware connect the *Base Station* to the USB port.
3. Whether you connect the *KIC Explorer* or *KIC Explorer Base Station*, Windows will recognize the USB device and the “Found New Hardware Wizard” will appear. Select the “Install the software automatically (recommended) option then select the “Next” button. See Figure 16.

Note: The “Found New Hardware Wizard” USB driver installation will run each time a unique *KIC Explorer* or *KIC Explorer Base Station* is connected to your computer.



Figure 16

4. Next, Windows will prompt the user regarding “Windows compatibility”. Select the “Continue Anyway” button. See Figure 17.



Figure 17

5. Windows will begin installing the USB software drivers. When complete a finished message will appear. Select the “Finish” button. See Figure 18.

Your *KIC Explorer* USB drivers are now installed and your *KIC Explorer* is ready to communicate with the *KIC 2000* software.



Figure 18

KIC Explorer Connection messages

Once the USB driver installation is complete and whenever the KIC Explorer or KIC Explorer Base Station is connected to the computers USB port a KIC message will appear telling the user that the KIC Explorer is connected. See Figure 19.

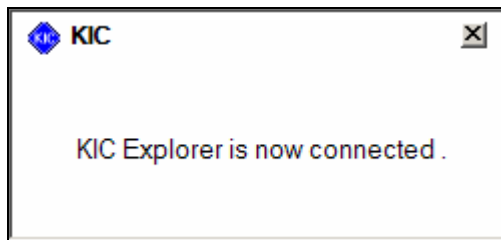


Figure 19

Whenever the KIC Explorer or KIC Explorer Base Station is disconnected from the computers USB port a KIC Message will appear telling the user that the KIC Explorer is now disconnected. See Figure 20.

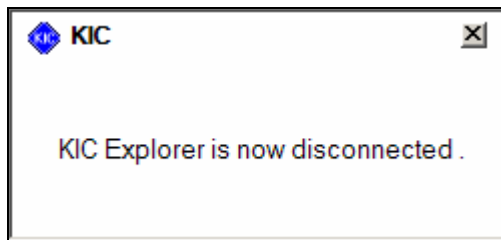


Figure 20

KIC Explorer Thermal Shields

KIC offers 2 models of *KIC Explorer* thermal shields:

- **Cool Touch** – The *Cool Touch-KIC Explorer* thermal shield is standard and is included with all standard *KIC Explorer* profiling kits. The *Cool Touch* shield can be handled without gloves, however gloves are recommended whenever heat is present. The *Cool Touch* thermal shield also allows the *KIC Explorer* longer duration at given temperatures during use.
- **Stainless Steel** – The *Stainless Steel -KIC Explorer* thermal shield is optional accessory for the *KIC Explorer*. The *Stainless Steel* thermal shield has no outer insulation and measures 1/8” lower in Height than the *Cool Touch* shield.

Important Note about KIC Explorers and Thermal shields:

Both the 7 channel and 12 channel *KIC Explorers* are not intended to be used without a *KIC* approved thermal shield and must remain inside their thermal shield at all times during use or during the *KIC Explorer* calibration procedure. Failing to do so will yield inaccurate temperature data and/or an inaccurate PWI value.

Loading the KIC Explorer into the Thermal Shield

12 Channel -*KIC Explorer* – Place the *KIC Explorer* into bottom half of the *KIC Explorer* thermal shield.

- The *Mini-TC* harnesses should rest flat on the metal block inside the shield.
- The thermocouple wires should exit from the front of the thermal shield.
- The *KIC Explorer* antenna should extend fully, and exit from the back of the thermal shield.

See Figure 21.

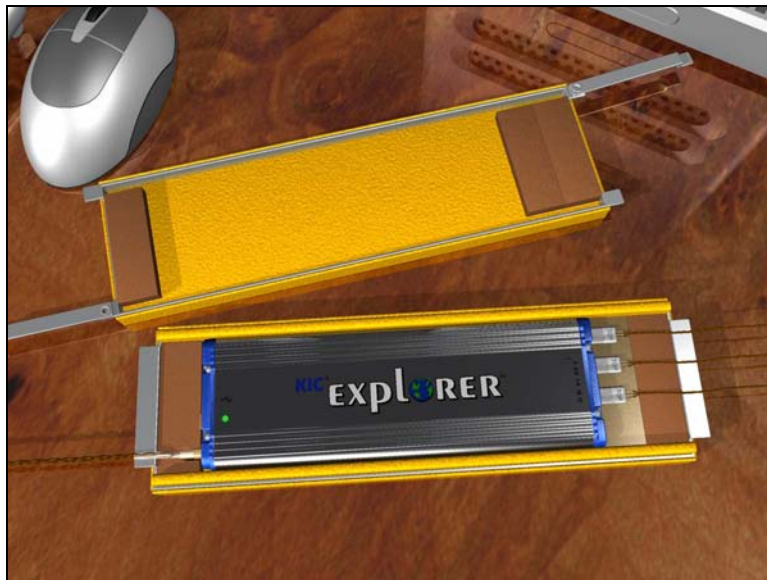


Figure 21: 12 Channel KIC Explorer

7 Channel -KIC Explorer – Place the *KIC Explorer* into bottom half of the *KIC Explorer* thermal shield.

- The thermocouples should rest flat on the bottom of the inside the shield.
- The thermocouple wires should exit from the front of the thermal shield.
- The *KIC Explorer* antenna should extend fully, and exit from the back of the thermal shield. See Figure 22.

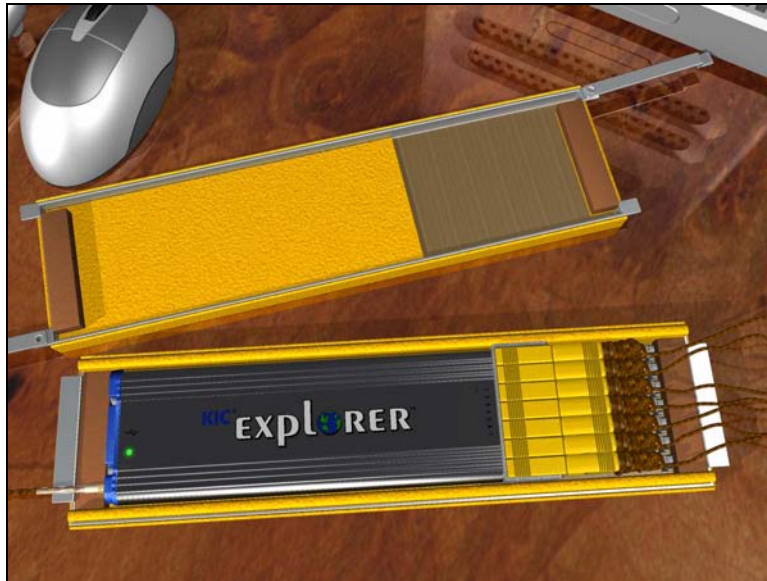


Figure 22: 7 Channel KIC Explorer

Once the *KIC Explorer* is set inside the bottom half of the thermal shield and the thermocouple wires and antenna are properly routed, verify the *KIC Explorer* is on by viewing the LED near the *On/Off* button. See Figure 22.

Next place the top-half of the *KIC Explorer* over the bottom half and then swing the latching mechanisms into the closed positions at each end. See Figure 23. Be careful not to damage the thermocouple wires or *KIC Explorer* antenna. (RF models only)



Figure 23: KIC Explorer Thermal Shield Latching Mechanism

Contact *KIC* Technical Support if you need any assistance with your *KIC Explorer*: tech@kicmail.com

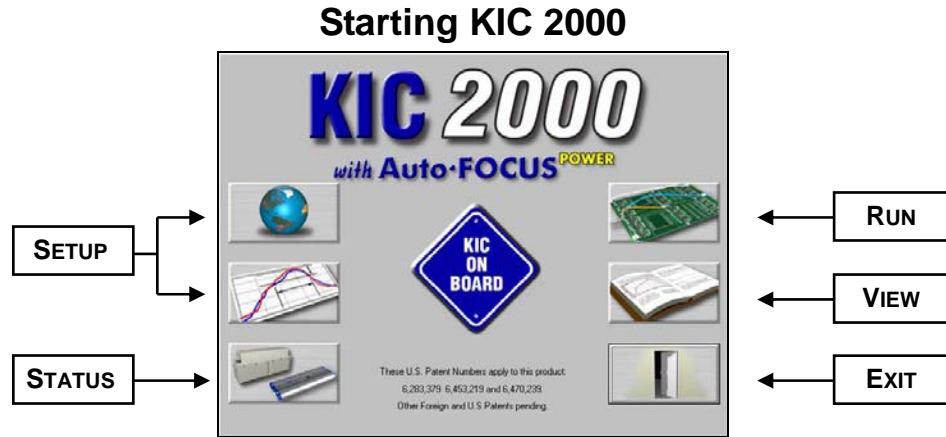


Figure 24: KIC 2000 Main Screen

The installation automatically adds a *KIC* folder to main Windows Start Menu. Click on the *Windows Start* and scroll up to the *KIC* folder. Then click on the *KIC 2000* icon. The *KIC 2000 Main Menu* should say “with **NAVIGATOR**” if you have purchased the *Navigator* option and installed the software key correctly, and “with **Auto-Focus**” if you purchased the *Auto-Focus* option.

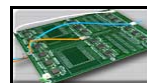
If you have purchased the *Power* option(s); The *KIC 2000 Main Menu* should say “with **NAVIGATOR Power**” if you purchased only the *Navigator* and *Power* options, and “with **Auto-Focus Power**” If you have purchased the *Auto-Focus* and *Power* options or the *Auto-Focus*, *Navigator* and *Power* options. See Figure 24.

There are six buttons on the *KIC 2000 Main Menu*. The buttons on the Left are for setup and status; the buttons on the Right are for running and viewing profiles and exiting the software. See the descriptions of the function for each button below.



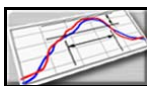
Global Preferences

Set units of measure, Maximum product start temperature, Oven name, Password.



Run a Profile

Begins the step-by-step procedure for running a product profile.



Define/Edit Process Window

Create or edit *Process Window* files for solder paste and profile specifications.



Profile Explorer

Filing system used to manage and view all profiles run using the KIC 2000 software.



Hardware Status

Show status of the Oven controller (if applicable), SlimKIC 2000 or KIC Explorer, and optional software key.



Exit

Exits the KIC 2000 software.

Quick-Start Profile Checklist

The following checklist will go through the steps necessary to setup and complete a temperature profile and, if necessary, use the prediction or *Navigator* and run a second profile with changes to the recipe. You will need the following items:

- ✓ **KIC profiler** with thermocouples and aluminum tape.
- ✓ **Test product** for profiling.
- ✓ **Knife or scissors** for cutting aluminum tape.
- ✓ **Kapton tape** –optional, to use as a strain relief for the TC wire.
- ✓ **Process Specs or Solder Paste name** – Complete name – may need specs if it is not on the list in the software.
- ✓ **Scale** to weigh (g/oz.) products if using optional Auto-Focus.
- ✓ **Gloves** – To handle product when it exits the oven.

1. Hardware Setup

- Make sure your KIC Profiler has batteries installed. .
- *SlimKIC 2000*: Verify that the *Receiver* is plugged into a COM port on the PC (if you have the transmit version this needs to be in close proximity to the oven) and the *power supply* is plugged into the cable and a power source as well.
- *KIC Explorer*: Verify that the *Base Station* is connected to a USB port on the PC (if you have the transmit version this needs to be in close proximity to the oven).
- *SlimKIC 2000*: The Red LED on the *Receiver* should be on.
- The *KIC Explorer Base Station* will not have any LEDs on until the *KIC 2000* software is running and communicating with the *KIC Explorer*.
- *SlimKIC 2000-Data log* model make sure you have the *download cable* plugged into a COM port on the PC and the small round 8-pin end plugged into the *SlimKIC 2000*.
- *KIC Explorer-Data Log* model make sure you have the download cable connected to a USB port on the PC and the other end connected to the *KIC Explorer*.

2. Global Preferences (Top-Left button)

- Choose your *units* for conveyor speed and distance, temperature, and weight. Set the *Maximum Product Start Temperature*. All of the thermocouples being used for the profile must be below this temperature in order to start a profile. It is best to set this at about 5 degrees Celsius above the average room temperature, or just leave it at the default setting.
- If you are using *Auto-Focus* software option, select the units for weight.
- If you are using *Auto-Focus* software option, an *Auto Focus* Tab will be added. You can change the *Profile Optimization Settings* and *Conveyor Speed Constraints* if needed, or just leave it at the default setting.
- Click on the *Green Checkmark* button when finished.

3. Define/Edit Process Window (Middle-Left button)

- Click on the Solder Paste Menu.
- Choose the paste you are using. If it is not on the list then choose *User Defined* from the list. You will need to enter you own specifications.
- Click on the *Green Checkmark* button.
- If you need to make adjustments to the spec limits or create your own click on the *Edit Specs* button.
- Click on the checkboxes for the specs you want to use, and then fill in the temperature and time limits.
- Click on the *Green Checkmark* button.

- At the top of the Process Window screen is a field to enter your *Process Window Name*.
- After entering the name click on the Green *Checkmark* button. The software will ask you if you want to save this new *Process Window*.
- Click on Yes.

4. **Run a Profile button**

- Enter in your *product name* or choose an existing one from the drop down list.
- Choose your *Process Window* (this was created in the previous step).
- Name your oven or choose an existing one from the drop down list. (*If you are running on a KIC 2000 compatible oven controller computer this was already done in the Global Preferences*).
- Click the *Forward Arrow* button and follow the instructions on each screen.
- At the *Select Thermocouples to Use* screen click on the TC's you have attached to the board and plugged into your KIC Profiler.
- **Make sure TC 1 is the Air TC and is extended 1 inch in front of the leading edge of the board.**
- Click the *Start Profile* (Green Traffic Light) button.
- Once you have placed the *KIC Profiler* and board in the oven and run the profile the *KIC Profiler Transmit* models will automatically retransmit all the data when it drops below the profile stop temperature as it exits. For the *Data log* models you must reconnect the download cable.
- The profile will be displayed and you can analyze and predict to optimize it, or if you have the *Navigator* option the software will optimize the profile and oven setup automatically. Upon exiting the *Graph* screen you can choose to run another profile with the *original* or *predicted* set points and conveyor speed.

Once you have set your Global Preferences and Process Windows you do not need to do these steps for every profile. You can just do Steps 1 & 4, and skip 2 and 3.

Global Preferences



Global Tab

Figure 25: Global Preferences

- **Units of Measure** – There are two drop down menus to choose units for Conveyor Speed and Distance, and weight. (Weight is Auto-Focus Specific)
- **Product Start Temperature** – The temperature of all the thermocouples attached to the product and *SlimKIC 2000* must be below this temperature to start a profile. This will insure that a profile is not started while the board is still to hot. Input value in the field or use Slider bar.
- **Profiling Hardware** –Select *SlimKIC 2000* or *KIC Explorer 12*, or 7 channel model. The *SlimKIC 2000* or *KIC Explorer* you purchased will be either a *Transmitter* capable or *Data log* capable. Select the appropriate option.
- If you are running on an oven with communication compatibility with the *KIC 2000 software*, there will also be a field to input the **oven name**. This *oven name* will be saved with the profile and can be sorted on in the *Profile Explorer*.
- **Languages** – Select the language that you wish to run the software. See important information about Languages on page 2.
- **Engineer Password** – By checking this and entering a password you can control access to certain menus in the *KIC 2000* software. See Figure 26.

Items protected by password



Figure 26

- *Global Preferences* button on the main screen
- In the *Process Window* Screen – Saving or deleting *Process Windows* or changes to *Process Windows*
- In the *Run a Profile* first screen – Remove Oven
- In the *Profile Explorer* – Delete a profile
- In the *Profile Graph* and Statistics screen – Access to the *Optimization* tab

Auto Focus tab

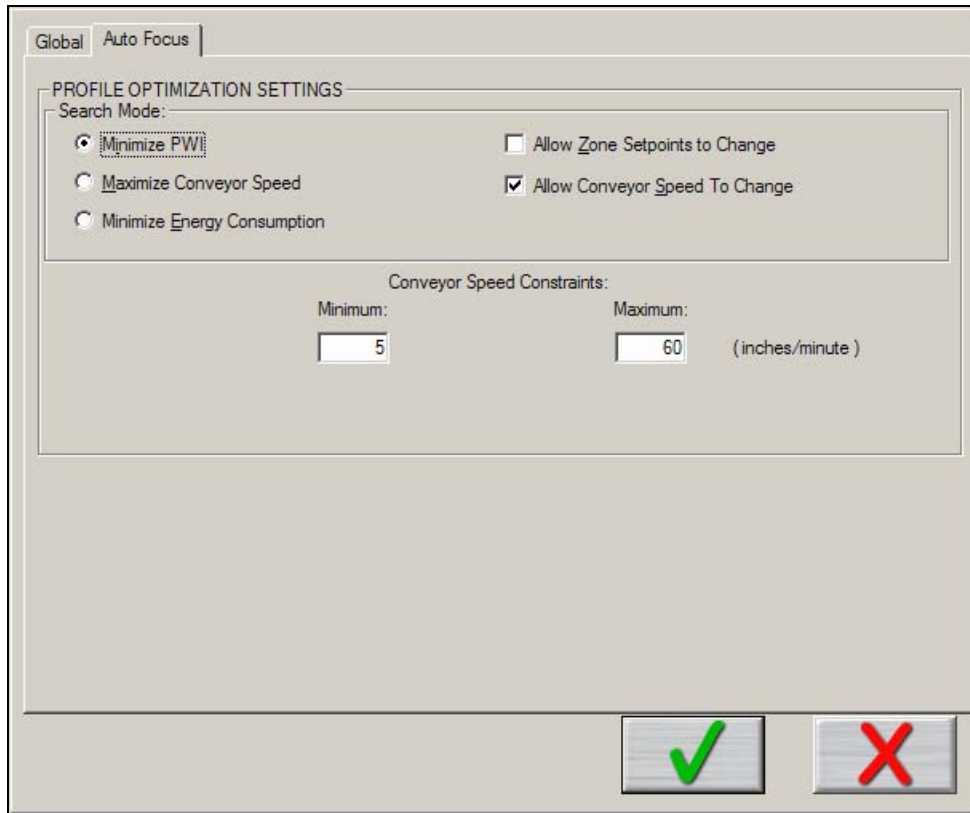


Figure 27: Global Preferences – Auto Focus Tab

Profile Optimization Settings

Search Mode for Auto-Focus

- **Minimize PWI** – Search for the combination of set point temperatures and conveyor speed that will minimize the *Process Window Index* (PWI).
- **Allow Zone Set points to Change** – This option will determine if *Auto-Focus* will include zone set point changes when predicting new solutions.
- **Allow Conveyor Speed to Change** - Choose whether to allow *Auto-Focus* to vary the conveyor speed. If you choose *Allow to Vary* you can set the minimum and maximum.
- **Maximize Conveyor Speed** – Search for the set point temperatures that will maximize conveyor speed.
- **Minimize Energy Consumption** – Optional *Power* feature; Search for the oven settings that will minimize the power consumption of the oven by finding set point solutions with slower conveyor speeds and lower temperature settings.

Conveyor Speed Constraints

Low – Select the minimum conveyor speed you would like *Auto-Focus* to recommend for new products.

High - Select the maximum conveyor speed you would like *Auto-Focus* to recommend for new products.

Process Window Setup

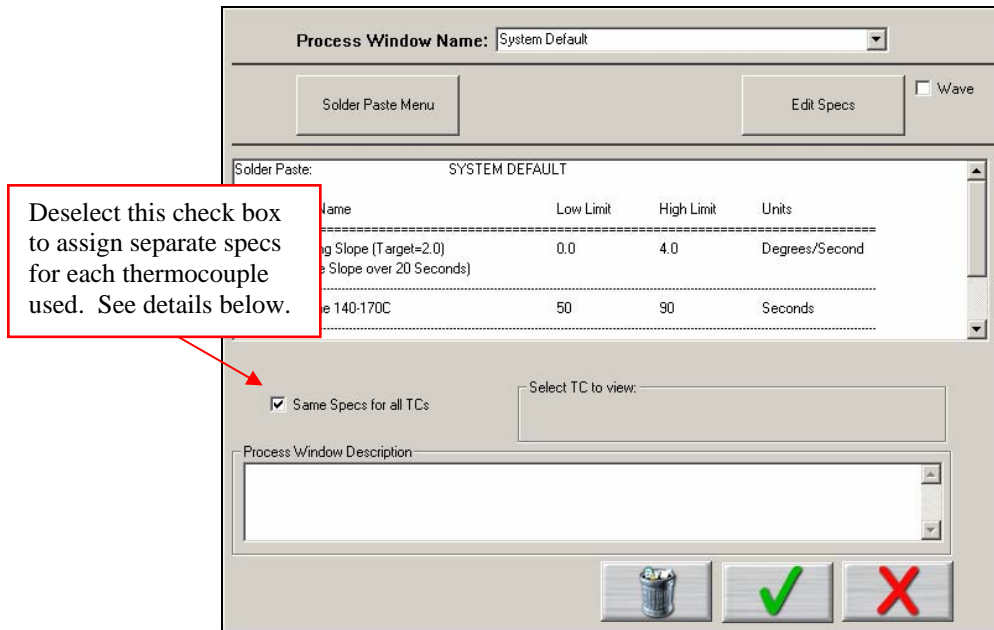
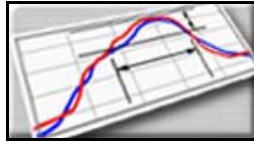


Figure 28: Process Window Setup

Process Window Name – Name of the KIC Process Window file that includes the statistics chosen and limits for those statistics, along with whatever text is typed in the *Description* field. See Figure 28.

- **Solder Paste Menu** - A read only library list of numerous solder pastes along with the statistics and limits suggested by the paste mfg., also included is a *User-Defined* option in the list which allows you to create a spec. of your own. See below for additional details.
- **Edit Specs** – Screen allowing the user to edit or choose statistics and limits for a chosen solder paste or define your own specs
- **Wave** – This radio button switches between the process specs and the *Wave* process specs for the selected *Process Window*. Set up a Process Window specific to *Wave* TCs for Wave Solder profiling.
- **Read only text box** – Shows the paste name, statistics name, and limits for a Process Window chosen, edited, or saved by the user. To edit select the *Edit Specs* button.
- **Same Specs for all TC's** – By deselecting this checkbox, you can assign separate specifications for each individual thermocouple you are using. After deselecting the checkbox, you'll need to click on the *Edit Specs* button to choose which statistics will be used and what spec limits will be set for each thermocouple used. This option would be used if you had component specific specifications that differ from the general solder paste specs. Another use for this would be if you wanted to monitor the actual board temperature as well as component temps. You would then only select the statistics for that TC that are relevant. If you wish to use the same specifications for all thermocouples, put a check mark in the box.
- **Select TC to View** – This dialog box will appear only if the *Same Specs for all TC's* checkbox is deselected. By clicking on the dropdown menu, you can view the specifications that have been defined for that number thermocouple. If a description was included, it will be displayed next to *Label*.
- **Process Window Description** – Field allowing for freehand notes for a particular Process Window

Solder Paste Menu

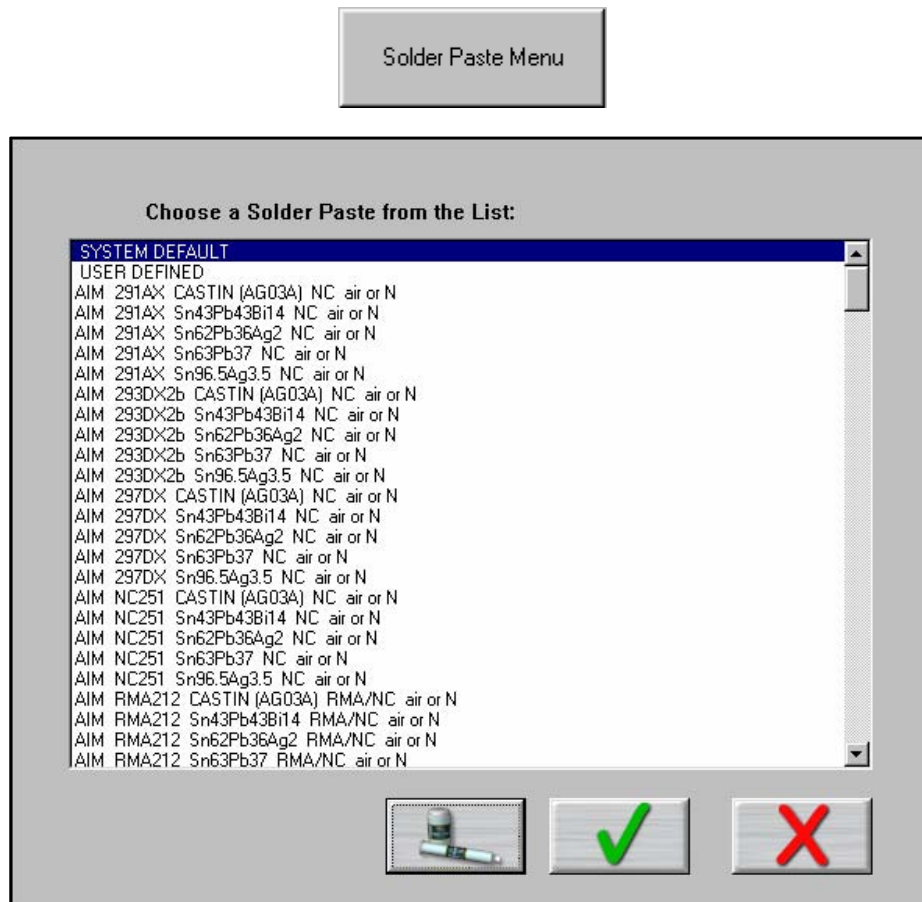


Figure 29: Solder Paste List

Solder Paste Menu - Once you have clicked on the *Solder Paste Menu* you will have a list of pastes to choose from. Use the scroll bar on the right to find your paste, and then click on the paste in the list. See Figure 29.

- Clicking on the **Green Check** will accept that paste and load its specs automatically. You will then return to the *Process Window* screen, after being presented disclaimer information.
- Clicking on the picture of the **paste jar and tube** will give you technical support information for the solder paste Mfg. that you chose.
- Clicking on the **Red X** will cancel your selection and return you to the *Process Window* screen without making any changes.

KIC updates the solder paste list on a regular basis, check KIC on the Internet for updates, www.kicthermal.com

Edit Specs

Edit Specs

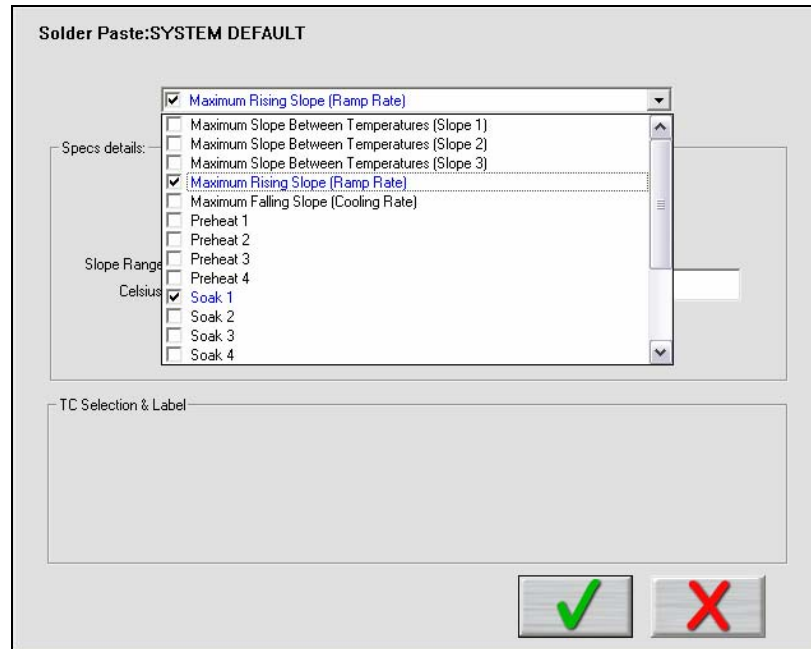


Figure 30: Process Window – Edit Specs

Process Window name is listed at the top of the screen. See Figure 30.

There is a single drop down list at the top that contains all of the available specifications that can be applied to your *Process Window*. These specifications are specific limits or a group of limits that define the overall *Process Window* for your product. These specifications include Slope, Preheat, Soak, Peak temperatures, and Time above temperatures.

Spec Details – The Spec Details coincide with the selected Specification. For each Specification selected, enter the Temperature, and Time limits. These limits are usually dictated by the solder paste used. The *KIC 2000* software uses the limits to measure the profile PWI.

Changes made within this screen will have a direct effect on the profile PWI value

Once you have completed all spec modifications you can click on the **Green check “DONE”** button and your changes will be applied. Clicking on the **Red X “CANCEL”** button will cancel your changes and exit.

Separate Specs

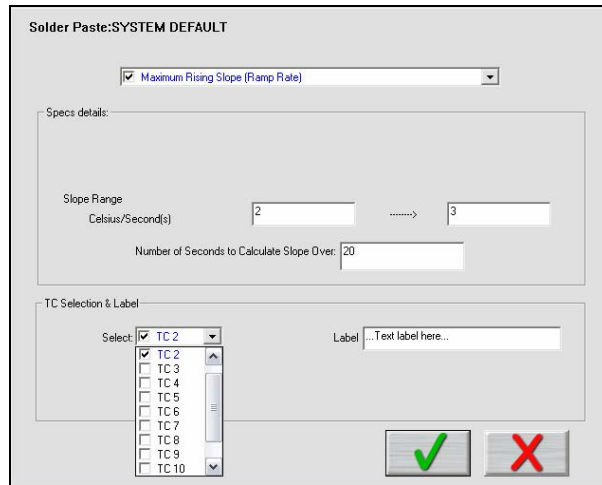


Figure 31: Process Window – Separate Specs

TC Selection & Label

If you choose to assign separate specs for each TC, click the *Edit Specs* button and the screen will now appear with an additional area for *TC Selection & Label*. See Figure 31.

- **Select** - Use the Select drop-down menu to select the TC whose specifications you wish to view/edit. The Spec Details for the selected TC is displayed.
- **TC Label** – This area will allow you to type in a description or label to identify that particular TC. If left blank, the TC's will simply be identified as TC2, TC3, etc.

When separate specs are being used, this is the only place where you can select or deselect which TC's will be used for a profile.

Once you have completed all edits of the specs you can click on the *Green Check* button and your changes will be applied. Clicking on the *Red X* (Cancel) button will cancel your changes and exit. See Figure 31.

If you are having trouble defining your process specifications, contact KIC and we will try to help. tech@kicmail.com

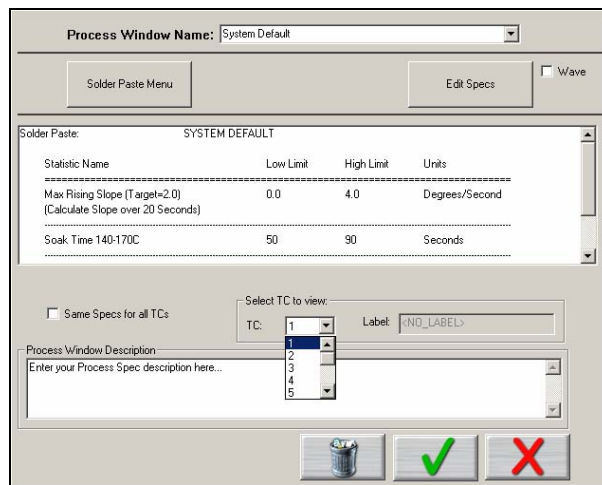


Figure 32: Process Window – Separate Specs – Select TC's

Select TC to View – Drop-down menu containing the TC's that have already been defined. (Previous step) See Figure 32.

Saving - Process Window

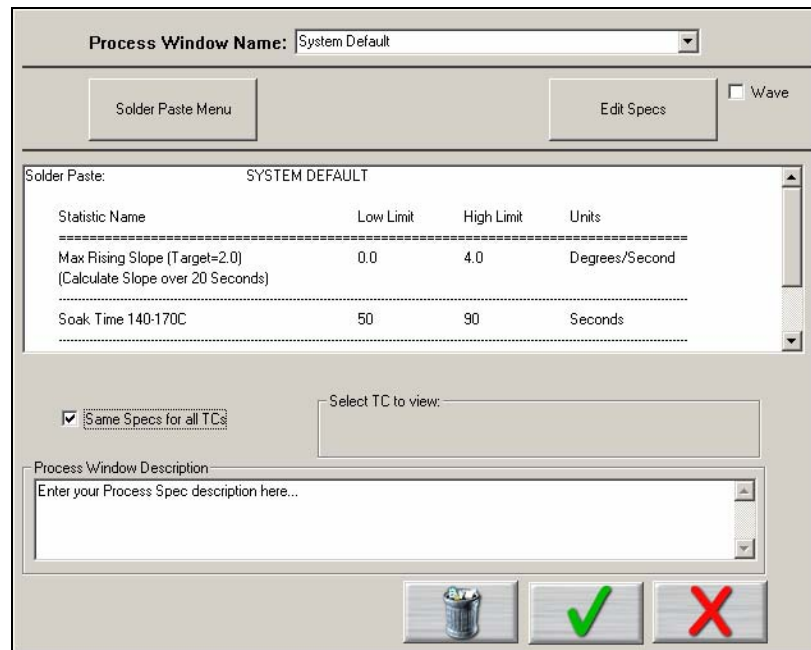


Figure 33

To create a *Process Window*, follow these steps:

1. **Choose a solder paste** from the *Solder Paste Menu*.
2. **Edit the specs** if necessary. See Page 23 for details.
3. **Enter a name the Process Window**
4. **Save** the Process Window

To save - Click on the **Green check (Save and Exit)** button. A dialog box will appear asking if you want to save the changes to the *new Process Window file*. See Figure 34.

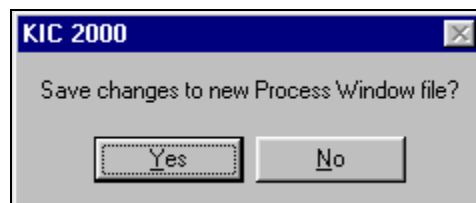


Figure 34

Clicking on *yes* will save it and exit to the main screen. You can click on *No* and click on the **Red X** “**Cancel button**” to exit without accepting or saving any changes.

Hardware Status

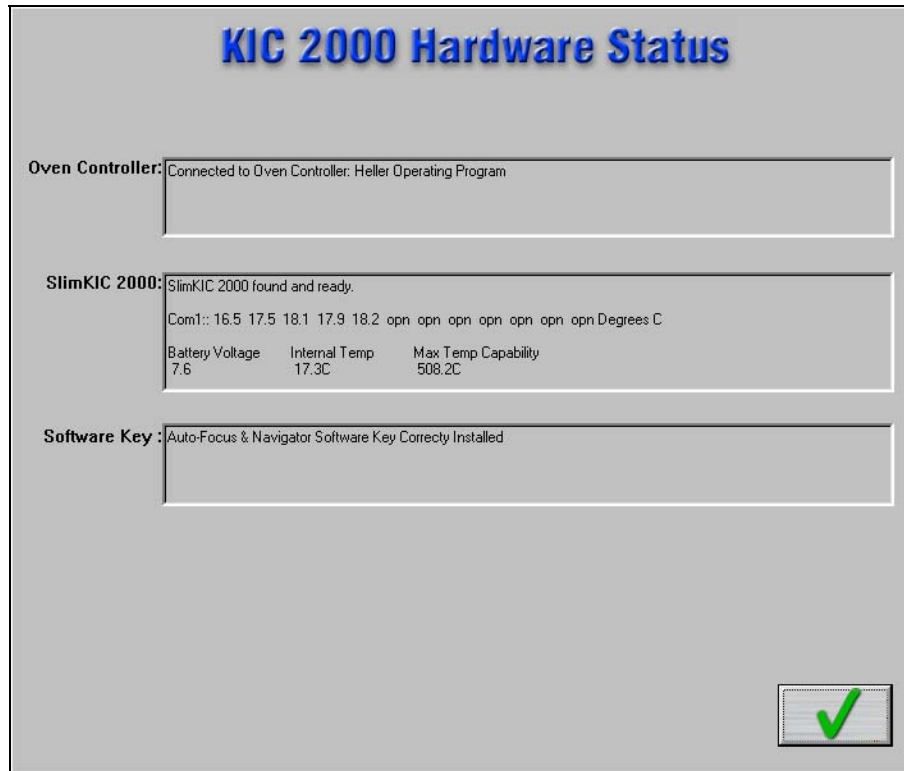


Figure 35: Hardware Status

Oven controller – Shows the status of the connection between the *KIC 2000* software and any connected oven. Contact KIC for details about connecting your reflow oven.

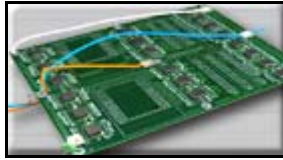
SlimKIC 2000/KIC Explorer – Shows the status of the *SlimKIC 2000* or *KIC Explorer* Profilers. This box displays the following information:

- *SlimKIC 2000/KIC Explorer* communication status
- COM port – when connected.
- Temperature display – for all connected thermocouples.
- Battery Voltage.
- Internal Temperature – Temperature inside the *SlimKIC 2000* case.
- Maximum Temperature Capability – This value determines the maximum temperature the *SlimKIC 2000* or *KIC Explorer* can read. This value can be changed if needed (*SlimKIC 2000* only). See the *SlimKIC 2000* calibration procedure for details page 95.

Software key – Shows the status of any software key that is connected. Displays the functions associated with the software key.

Note: Only one software key can be connected at any given time. The KIC 2000 software will not detect multiple software keys. If you have purchased new software options that require an additional software key, contact KIC Technical Support, tech@kicmail.com.

Run a Profile



The Run a Profile button will guide you through 6-7 screens, which will finish at a completed and graphed profile. To move through these screens you can use the Back, Next, or Cancel buttons. The Cancel button will take you back to the Main Menu.

Figure 36: Run a Profile Screen #1

Name Product and Select Process Window

- **Product Name** – Enter in a unique product name (long file names are acceptable) or choose an existing product name from the drop down list.
- **Process Window** – Choose a *Process Window* from the drop down list. These *Process Windows* are created in the *Define/Edit Process Window* screen which is accessed from the *KIC 2000* main screen.
- **Application** – Select your *Application* type from the list. The *KIC 2000* software will function depending on the selected *Application* type. Some variables that might change depending on the selected *Application* type are: data-sample rate, profile temperature trigger values, and specific artwork. It is very important to choose the correct *Application* type. If you are unsure, you can contact KIC technical support for help, tech@kicmail.com.
 - For wave solder profiles see page 53.
 - For Cure profiles see page 81.
 - For Temperature vs. Time profiles see page 82.
 - For Wave Surfer information see page 53.
- **Oven Name** – Enter a unique oven name or choose an existing oven from the drop down list. The oven will have information about the number of zones saved with it as well as other zone information. This is entered on the next screen. **Remove Oven** button will delete the oven name currently displayed in the field.

If you are running the software on an oven controller computer that is communication compatible with the *KIC 2000* software the number of zones is already known and the oven name will be entered in the *Global Preferences* screen, not on this screen. Also the *Entering Oven Recipe* screen is skipped because the *KIC 2000* software already has the recipe information from the oven controller.

- **Enable Auto-Focus** – Enables or disables the Auto Focus tool for the current profile.
- **Profile Description** – Allows for freehand typing of any notes you may want to include with this profile.

Auto-Focus, Product Dimensions

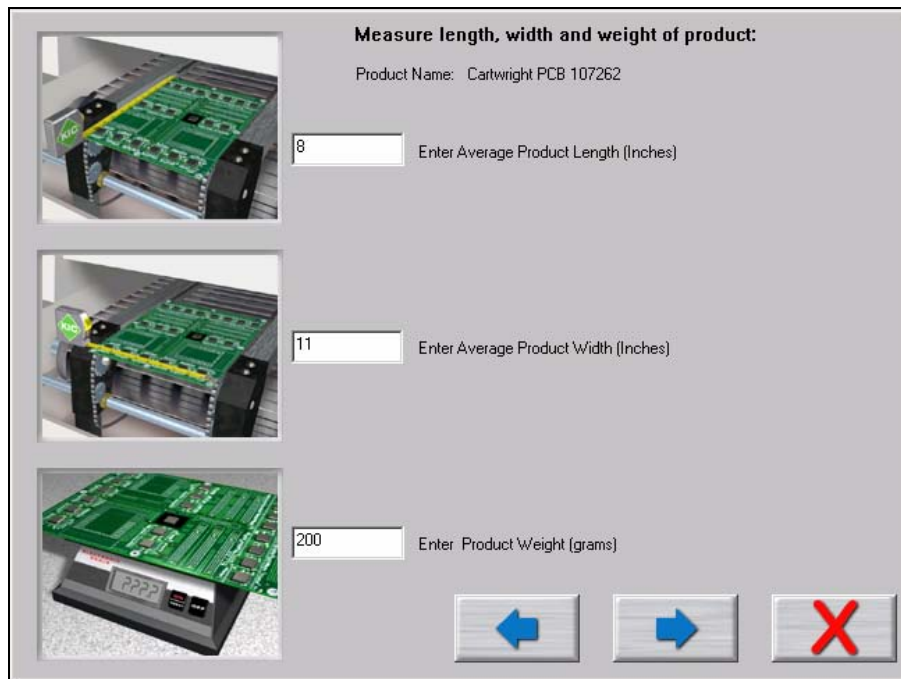


Figure 37: Run a Profile – Auto Focus screen #1

If you have purchased the *Auto-Focus* software option, this screen will appear. Enter the Length, Width, and weight of your product, and then choose the *Forward Arrow* button. See Figure 37.

- This product will be included in the Auto-Focus library from this point forward.
- Make sure to measure using the correct units of measurement.

Auto-Focus, Confirm

This screen is displayed in order to confirm the product measurements as entered by the user. See Figure 38.

The user has two options:

1. *Use current Oven Recipe* – use the most recent oven recipe setting for this product. The next screen will display the most recent set points and conveyor speed for this product.
2. Use Auto-Focus to find an in-spec Oven Recipe – This will initiate the Auto-Focus option for this product.

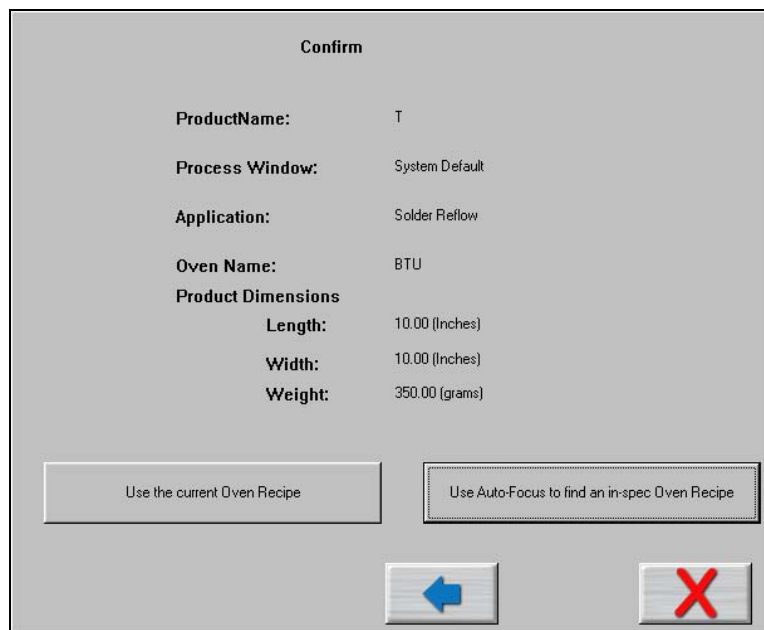


Figure 38: Run a Profile – Auto Focus screen #2

If the *Use Auto-Focus...* button is selected and no matching product is found, this dialog box will appear, choose the *OK* button. See Figure 39.

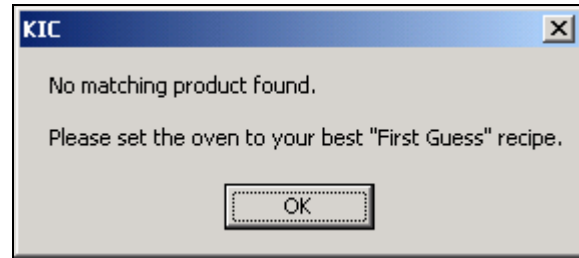


Figure 39

The user will be returned to the *Confirm* screen. Select the *Use Current Oven Recipe* button and enter the oven set points and conveyor speed you want to start with.

If the *Use Auto-Focus...* button is selected, but there are not enough products in the database to confidently give an expected PWI, this dialog box will appear: See Figure 40.

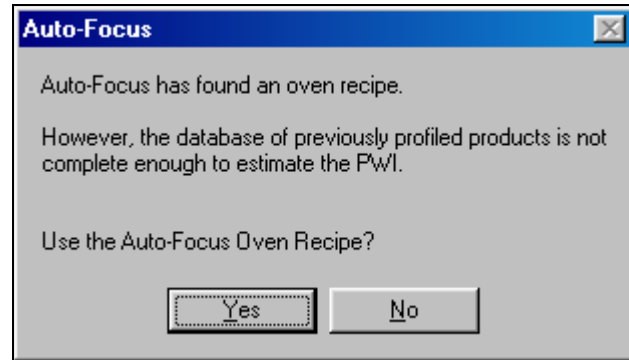


Figure 40

If the user selects **Yes**, the next dialog box shows the *Auto-Focus-First Guess* recipe in order for the user to confirm.

If **No**, the user will be returned to the *Confirm* screen. Select the *Use Current Oven Recipe* button and enter the oven set points and conveyor speed you want to start with.

If the *Use Auto-Focus...* button is selected and there are a sufficient number of boards in the data base, the following dialog box will appear: See Figure 41.

If the user selects **Yes**, the next dialog box shows the *Auto-Focus - First Guess* recipe in order for the user to confirm.

If **No**, the user will be returned to the *Confirm* screen. Select the *Use Current Oven Recipe* button and enter the oven set points and conveyor speed you want to start with.

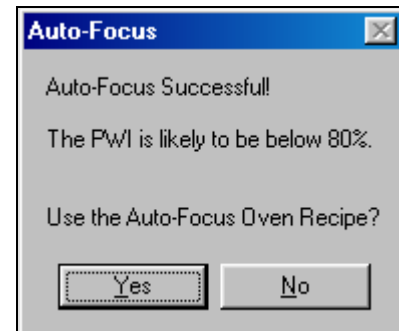


Figure 41

If the user selects **YES**, they will be prompted to: *Confirm the First Guess Recipe*. See Figure 42.

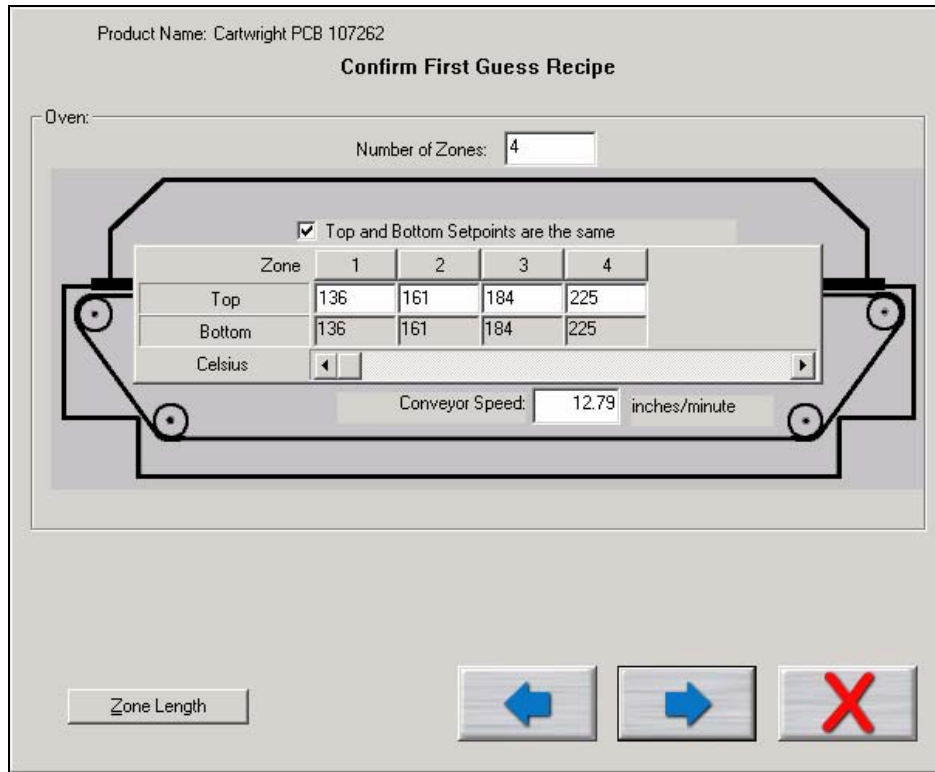


Figure 42: Run a Profile – Auto Focus screen #3

Confirm the recipe and select the *Forward Arrow* button. If there is no communication with the oven controller, the following dialog box appears: The user must manually enter the recipe information on the oven. See Figure 43.

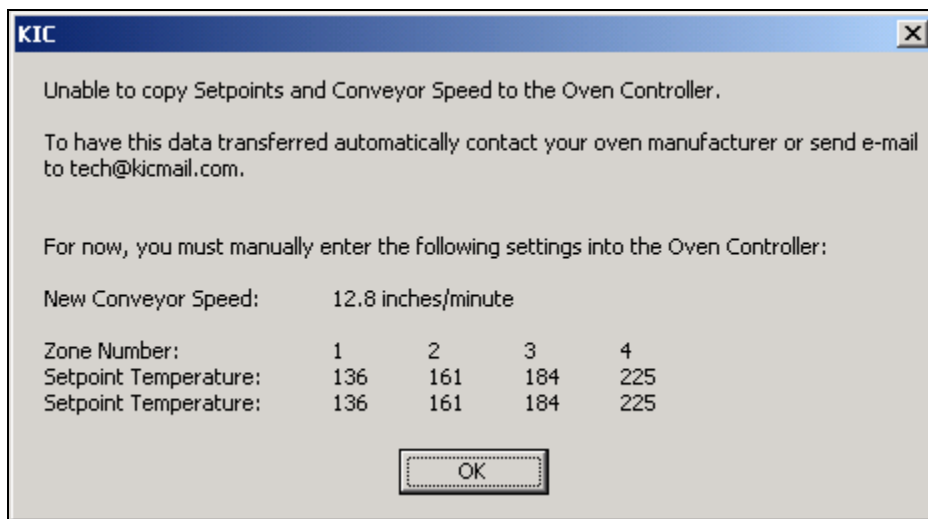


Figure 43

If there is communication with the oven, then the recipe is copied directly to the oven.

Entering Oven Recipe

Product Name: Navigator Demo Board #1

Enter Oven Setpoints and Conveyor Speed

Oven:Line2

Number of Zones:

Top and Bottom Setpoints are the same

Zone	1	2	3	4	5	6
Top	150	160	170	180	180	180
Bottom	150	160	170	180	180	180
Celsius	<input type="text" value=""/>					

Conveyor Speed: inches/minute

To have the oven setpoints and conveyor speed automatically transfer to this screen, please contact Your oven manufacturer, or KIC at tech@kicmail.com

Zone Length

← → ✕

Figure 44: Run a Profile screen #2

This screen does not appear when the *KIC 2000* is communicating with the oven controller.

The recipe information is:

Number of Zones – Enter in number of heated zones in your oven.

Top and Bottom Set points are the Same – If your settings always have the top and bottom set points the same, check this. The bottom set point will automatically be entered as you enter the top set point.

Different top and bottom set points

The software gives you the ability to enter separate top and bottom zone set points, and have them displayed on the graph. And, when used with the *Navigator*, it will maintain the top and bottom offset in its prediction. During the *Run a Profile* routine, when you get to the screen where you enter in the zone set points, there is a check box for *Top and Bottom Set points are the same*. Deselect that checkbox if you are running different top and bottom set points. Either way, using the same or different top and bottom set points, the graph will always display a top and bottom set point values.

Zone Temperature fields – You will have a field for input of the temperature setting for each zone based on the *Number of Zones* you enter at the top. For more than six zones you will have to scroll over to enter the temperatures.

Conveyor Speed – Enter the Conveyor speed that your oven is currently set at.

Zone Length – See page 32 for details.

Zone Length and Minimum/Maximum Temperature Settings

Verify the Length of Each Zone and the Minimum and Maximum Setpoint Temperatures

Oven: 123

Number of Zones: 6

All Zone Lengths are the same

Zone	1	2	3	4	5	6
Length (Inches)	15	15	15	15	15	15
Min Setpoint	70	70	70	70	70	70
Max Setpoint	300	300	300	300	300	300

The total distance of all the zones must add up to the distance from the start of the first zone to the end of the last zone.
If there is a space between zones, add half the space to each zone.

Navigation buttons: Left Arrow, Right Arrow, Red X

Figure 45: Run a Profile screen #3

By default the *KIC 2000* software assumes each temperature zone in your oven is the same length. For better profile display and profile prediction capabilities (*Navigator*) the user can manually enter the correct zone lengths. See Figure 45.

Minimum and Maximum Set point Temperatures

This setting is used by the *Navigator* option as limits for its prediction results. The *KIC 2000* software uses default settings of: 70°C min, and 300°C max.

Enter the *Minimum and Maximum* temperature settings that your oven can control to. See Figure 45. This will help the *Navigator* option maximize its prediction results.

Zone lengths – Deselect the checkbox if your zone lengths are not the same. Enter the actual length for each zone.

If your oven has non-uniform sized zones or has a large gap between some of your zones you will need to edit the lengths to increase the accuracy of the predictions of the KIC 2000 software.

Oven Initialization File

For every oven you create a name for in the software an initialization file is created. This file is given the name that you give your oven with a .kiccfg extension. This file will be located in

C:\KIC Profiler 2000\Ovens.

This file holds information about the zones in your oven, for the use by the *KIC 2000* prediction algorithm.

By default the software will start with the following assumptions unless changed by the user:

- The zones are uniform and consecutive with no large gaps between them.
- The maximum rising temperature difference between any two consecutive heated zones is 50 degrees Celsius.
- The maximum falling temperature difference between any two consecutive heated zones is 20 degrees Celsius.
- The maximum valley temperature difference between any 3 consecutive heated zones is 20 degrees.

Instructions on attaching TC's

The next few screens, *Run a Profile Screens # 4-6*, visually demonstrate attaching the thermocouples to the board.

It is very important that you attach the first thermocouple (*Air TC*) so it extends 1-inch in front of the leading edge of the board.

This Air Thermocouple MUST be plugged into the first channel on the SlimKIC 2000 or KIC Explorer.

Attach the rest of the thermocouples and plug them into the *SlimKIC 2000 or KIC Explorer*. Order is not important, unless you plan on labeling where they are attached.

Depending on the selected *Application* type and or KIC profiler, the displayed graphics may differ. In any case, always follow the on-screen directions. Contact KIC Technical support for assistance, tech@kicmail.com.

Example of *KIC Explorer-Solder Reflow, Cure, and Wave Off* - *Application* type specific graphics:

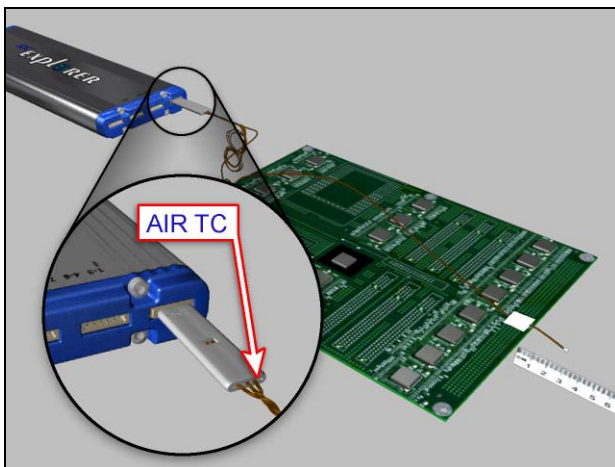


Figure 46: Run a Profile screen #4

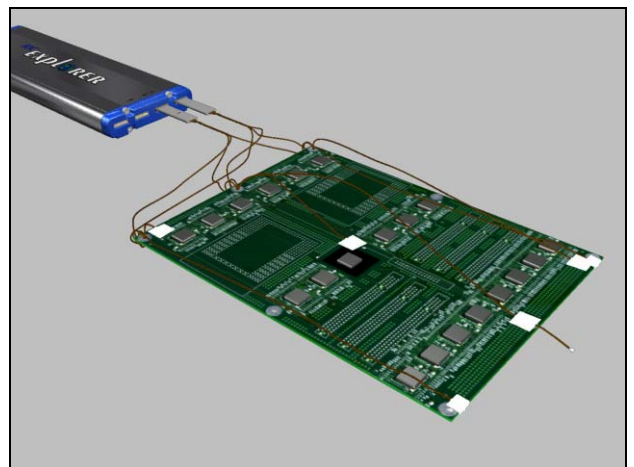


Figure 47: Run a Profile screen #5

Example of *SlimKIC 2000-Solder Reflow, Cure, and Wave Off* - *Application* type specific graphics:

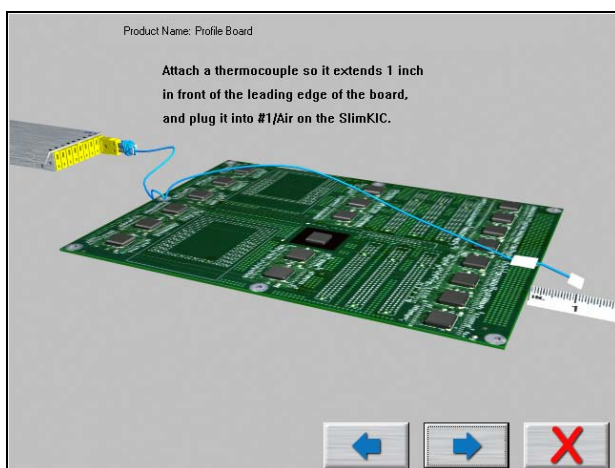


Figure 48: Run a Profile screen #4



Figure 49: Run a Profile screen #5

Example of *SlimKIC 2000 Semiconductor* - Application type specific graphics:

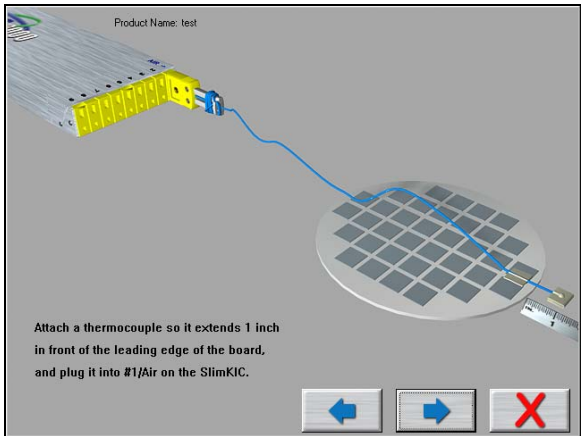


Figure 50: Run a Profile screen #4

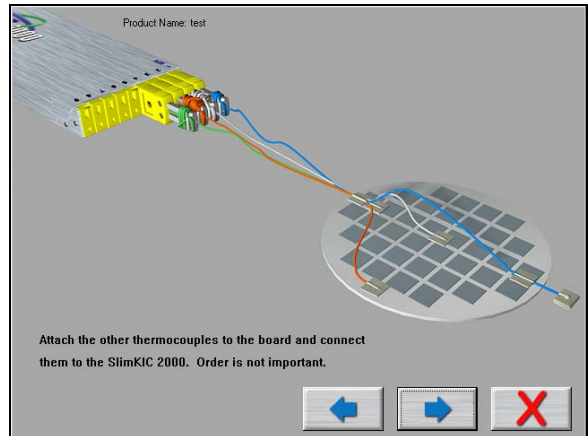


Figure 51: Run a Profile screen #5

Wave On – Application type specific graphics

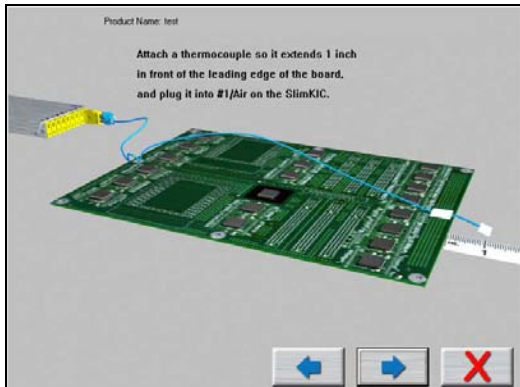


Figure 52: Run a Profile screen #4

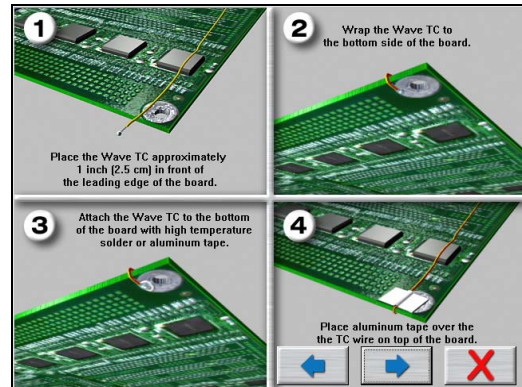


Figure 53: Run a Profile screen #5

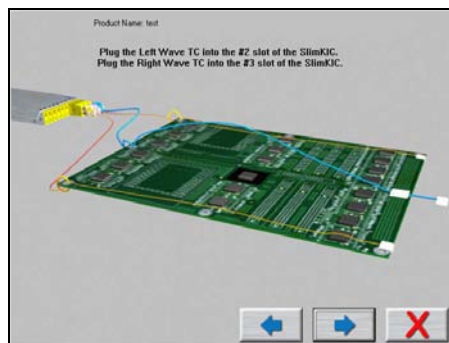


Figure 54: Run a Profile screen #6

Please see the Appendix for using the Aluminum tape to attach your thermocouples.

Select Thermocouples and Start Profile

Product Name: Profile board

Select the Thermocouple(s) used for this Profile:

Include Thermocouple(TC) Labels (20 char. Max)

	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6
Live Reading	21.6	21.8	21.8	21.8		
Label	AIR TC	Large Comp	Small comp	Bare Board		

	TC 7	TC 8	TC 9	TC 10	TC 11	TC 12
Live Reading						
Label						

Battery Voltage 8.5 SlimKIC Internal Temperature 21.1

Using SLIMKIC 2000 Transmitter

Select this button to start a profile.

Figure 55: Run a Profile screen #7 – Select TC's

Include Thermocouple (TC) Labels (20 char. Max) – Checking this will display a field below each TC that is checked. Up to 20 characters can be used to describe the placement or location of that TC.

TC Number Check Box – Place a check next to each TC channel that is going to be used for this profile. TC number 1 is always used for the *AIR TC*. You must have at least one other TC being used.

Live Reading – When the SlimKIC 2000 or *KIC Explorer* are on and either plugged into the download cable for data logging or transmitting to the receiver which is plugged in, you will see live temperature updates for the TC's plugged into the *KIC Profiler*. The TC checkbox must be checked as well to get the temperature updates. If you do not see live temperature readings recheck all the cable and or computer connections.

Battery Voltage – This displays a live reading of the *SlimKIC 2000* or *KIC Explorer* battery voltage. The software will recognize if your battery voltage is too low and not allow you to start a profile until you have a battery with enough voltage to complete the profile.

SlimKIC 2000/KIC Explorer Internal Temperature – This displays the internal temperature of the *SlimKIC 2000* or *KIC Explorer* profilers. If the temperature is too high to complete the profile and stay under the maximum temperature rating for the unit, it will not allow you to start the profile. You must wait until the *KIC Profiler* is cool enough. The software will let you know what temperature you will have to drop below.

If the selected Process Window has Separate Specs for TC's, then the user must return to the Process Window-Edit Specs screen in order select/deselect TC's or change their text labels.

Buttons

Back (Arrow) This button takes you back to the previous screen.

Start Profile (Green Traffic Light) Select this button to start the profile.

Cancel (Red X) Button cancels the profile.

Starting the Profile

Make sure your KIC Profiler is powered on and ready to profile.

Once the oven has stabilized and you are ready to load the profiler and profile board into the oven select the Green Traffic Light button.

- Depending on the settings in the *SlimKIC 2000* or *KIC Explorer* and in the software you may have to initialize the profiler at times. The *KIC 2000* software will let you know when this is necessary. This is done by attaching the cable from the receiver to the back of the *SlimKIC 2000* or by connecting the communication cable directly to the *KIC Explorer*. Click on *OK* when it gives the message that the initialization was successful. You will then be able to continue as normal.
- After you select on the *Profile Start* button the software will ask if all the oven control thermocouples are within 2 degrees of the set point value. See Figure 56.

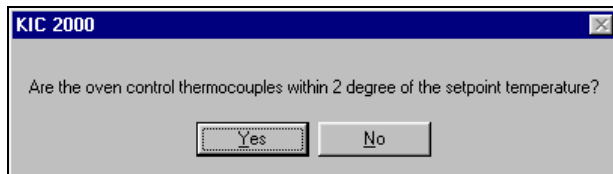


Figure 56

- If you choose **Yes**, you will proceed to the next profile sequence screen.
- **If you choose NO**, it will ask you to let the oven stabilize. If the oven has stabilized and it still is not within 2 degrees of the set values, your oven is not able to control to those oven settings. Set the control temperatures it can control, return to the *Main Screen* and start the profile over. See Figure 57.

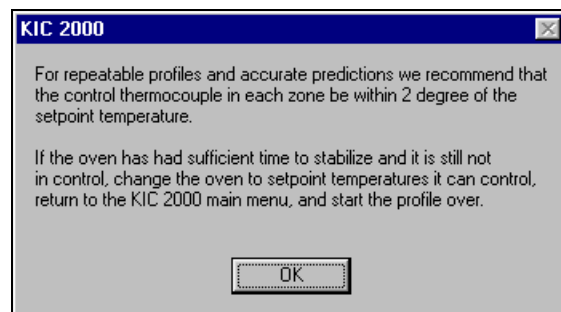


Figure 57

Follow the on-screen instructions for best results

If your answer is **YES** it will prompt you to place the *KIC Profiler and profile board* into the oven. See Figure 58.

The maximum operating temperature for the *SlimKIC 2000* profiler is 105°C/220°F. If your process temperatures will cause the *SlimKIC* to exceed this limit then **DO NOT** place the profiler into the oven.

The maximum operating temperature for the *KIC Explorer* profiler is 85°C/185°F. If your process temperatures will cause the *KIC Explorer* to exceed this limit then **DO NOT** place the profiler into the oven.

Trailing Wire Profiling

The *SlimKIC 2000* and *KIC Explorer* profilers can be used with elongated thermocouples or a thermocouple extension long enough to pass through the process. This is especially useful for low clearance processes or higher temperature processes that would normally cause a *KIC* profiler to overheat while inside the oven.

If you plan to keep the *SlimKIC 2000* or *KIC Explorer* connected during the profile, ignore any message to unplug the download cable from the profiler. At the end of the profile, be sure and leave the product TC's connected long enough to achieve the profile-stop trigger value, 110°C, otherwise the profile will not complete. Leave the product TC's connected until the download has completed and the *KIC 2000* asks you to turn off the *KIC* profiler.

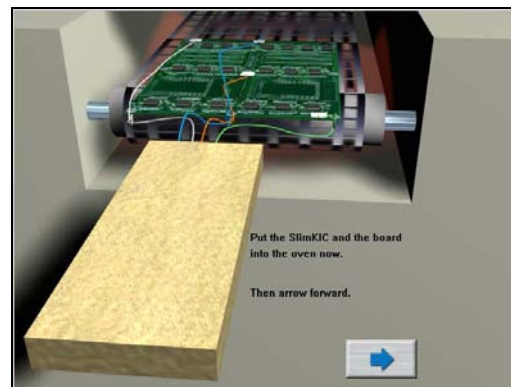


Figure 58

KIC 2000 Data Collection Sample Rates

KIC Profiler Sample Rates	
Application Type	Samples/Sec
Solder Reflow	4
Wave Solder	10
Temp vs. Time	Variable
Cure	3
Semiconductor	4

Table 1

The KIC Profiler sample rates will vary depending on the selected Application type and or profile length.

Note: KIC 2000 sample rates for both the *SlimKIC 2000* and *KIC Explorer* profilers are the same for each profile application. See Table 1.

Live Profile Graph Display

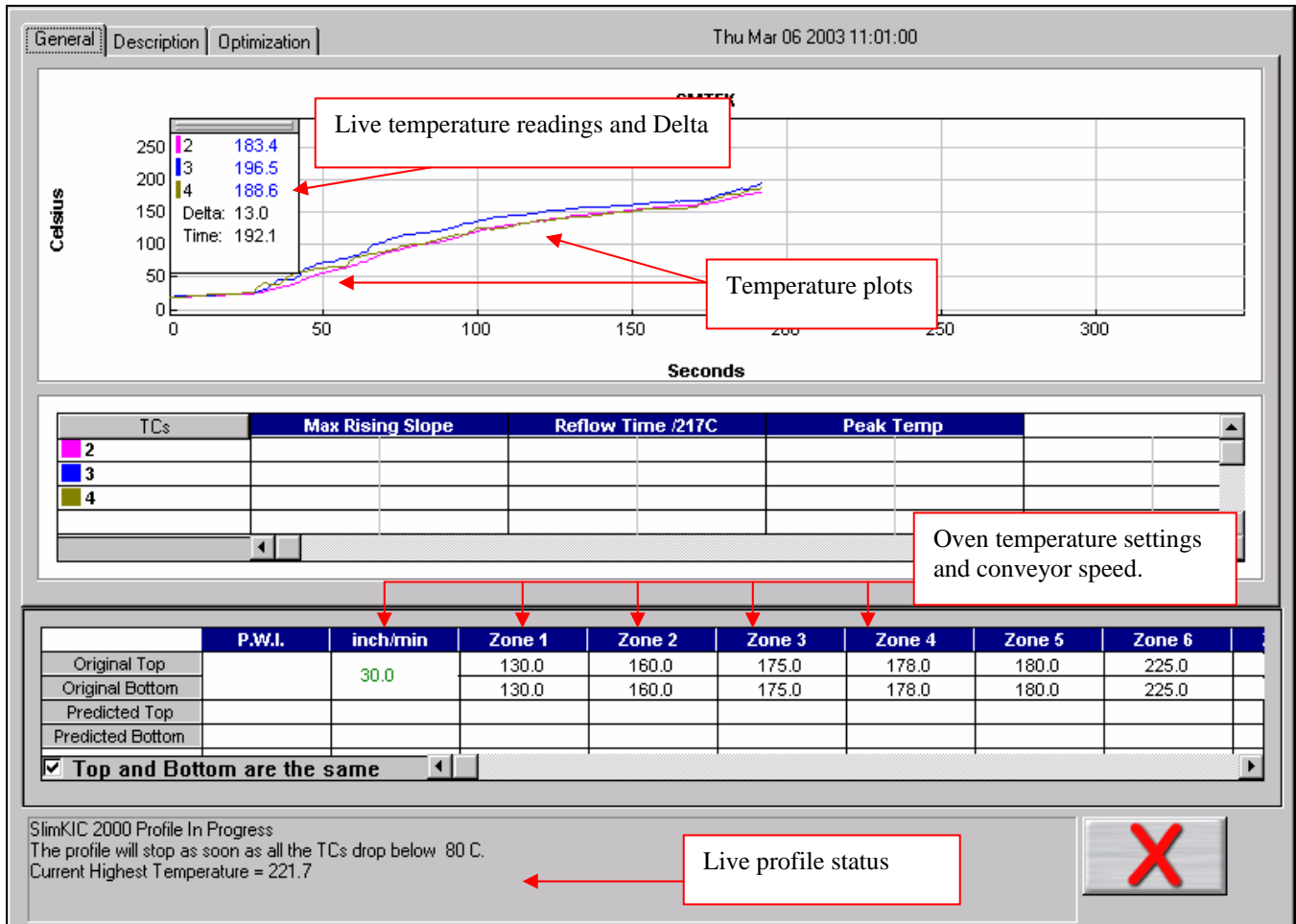


Figure 59: Live Profile Graph Display

The Live Graph screen shows the real-time plot of the product going through the oven. This will only appear for the *KIC profiler-RF models* or for *Temp vs. Time* profiles. See Figure 59. During the live profile all of the tabs on the screen are inaccessible. The only action that you can take at this point is to cancel the profile by clicking on the RED X button or the *Profile Stop* button for *Temp vs. Time*.

The Live Profile Graph display will remain on your screen until the *KIC Profiler* has achieved the trigger temperature that determines the profile end.

Profile Status

The bottom part of the screen will keep you apprised of the progress of the profile in reference to the *KIC Profiler* hardware status.

- Waiting for the Air TC to exceed the start trigger temperature.
- Profile started- Waiting for the Air TC to exceed the midpoint trigger temperature.
- Profile will stop when all thermocouples drop below 80 Celsius.
- SlimKIC currently retransmitting.
- SlimKIC retransmission successful!

During the Live Profile:

- The live profile is plotted on the graph, *KIC Profiler RF* models only.
- The current temperatures for each thermocouple and the Delta between them are displayed in a small window in the upper-Left hand corner of the profile graph. The elapsed time is also displayed, *KIC profiler Transmitter* models only.
- The current oven temperature set points and conveyor speed for this profile is displayed beneath the *Statistics table*.

Temperature Triggers

The *KIC 2000* software uses temperature triggers for the *SlimKIC 2000* and *KIC Explorer* profilers to determine when the profile is started, and when it ends. The use of temperature triggers makes it so that the user does not have to worry about starting the profile a specific point or time. Instead the profile is started at the same temperature and ends at the same point each time you profile, making the profile data collection process easy and consistent.

The default temperature triggers are as follows for each respective *Application* type:

Wave Solder - Wave On		Wave Solder - Wave Off	
Profile start	33°C/92°F	Profile start	33°C/92°F
Mid trigger	110°C/230°F	Mid trigger	130C/266F
Profile end	90°C/194°F	Profile end	110C/230F

Solder Reflow		Cure		Semiconductor	
Profile start	33°C/92°F	Profile start	33°C/92°F	Profile start	33°C/92°F
Mid trigger	130°C/266°F	Mid trigger	100°C/212°F	Mid trigger	130°C/266°F
Profile end	110°C/230°F	Profile end	80°C/176°F	Profile end	110°C/230°F

The default trigger values should be fine for most processes. The Profile start-trigger is determined by the *Maximum Product Temperature at Start of Profile* setting in the *Global Preferences* screen. The start trigger value is always 2°C above this setting.

In the event that the mid-trigger, or end trigger values need to be changed, or you feel that you are experiencing a problem related to temperature triggers please contact *KIC* Technical support, tech@kicemail.com.

For Temperature vs. Time profiling, trigger temperatures are not used. Instead a Profile Stop button is displayed in the bottom-Right hand corner of the profile graph screen.

KIC 2000 Profile Retransmission

For users of the *SlimKIC 2000* or *KIC Explorer* thermal profilers with RF capability.

While the *KIC Profiler* transmits the live profile data to the *KIC 2000* software; it simultaneously stores the profile data in its memory.

Once the *KIC profiler* detects that all of the thermocouples have cooled below the profile-end trigger value, it will begin retransmitting the profile data to the *KIC 2000 software* via the *SlimKIC 2000* receiver or *KIC Explorer Base Station*. When retransmission begins, the *KIC profiler* will send the profile in data packets. The retransmission status is displayed at the bottom of the screen. See Figure 60.

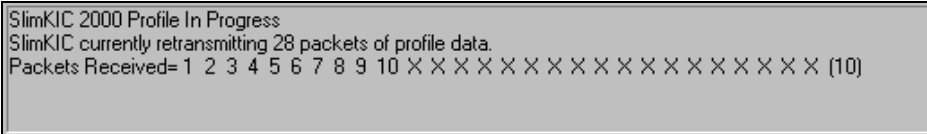


Figure 60: Retransmission of Profile Data, RF Profilers only

When all of the data packets have been received, the software will display a message asking you to turn the *SlimKIC 2000* or the *KIC Explorer* off, choose OK. **Failing to turn the KIC profiler off will drain the batteries.**

Next, the *KIC 2000* software will automatically analyze the profile data and presents the profile and statistics. If you purchased the *Navigator* option, the predicted oven settings will be displayed as well. See Figure 61 through Figure 64.

Viewing the profile and statistics

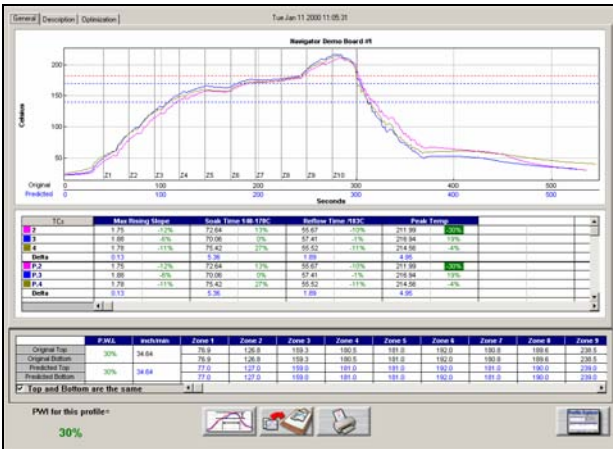


Figure 61

General Tab – Shows graph, statistics, and recipe

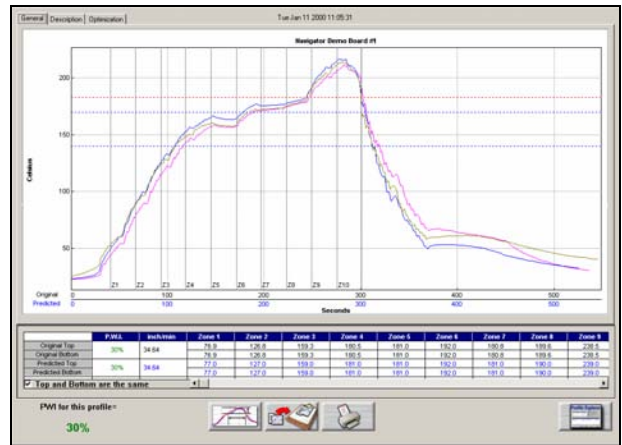


Figure 62

General Tab – Graph view (double-click on graph)

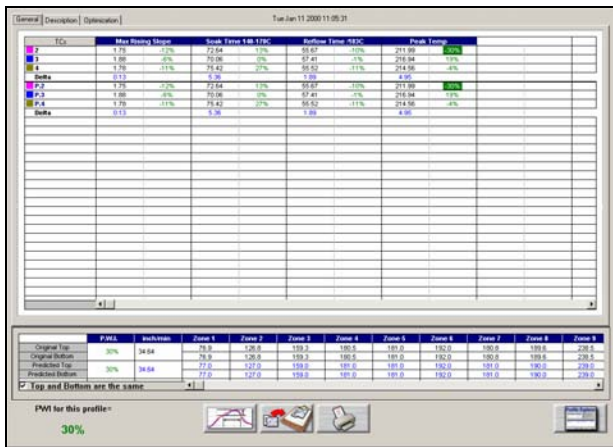


Figure 63

General Tab – Statistic view (double-click on stats table)

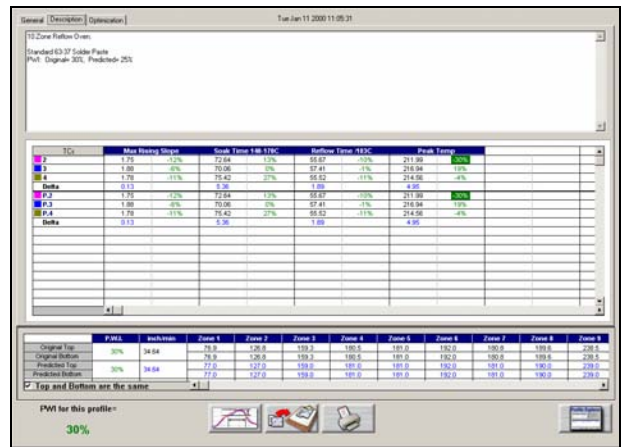


Figure 64

Description Tab – Shows Description notes, statistics, and recipe

Profile Optimization with the KIC Navigator Option

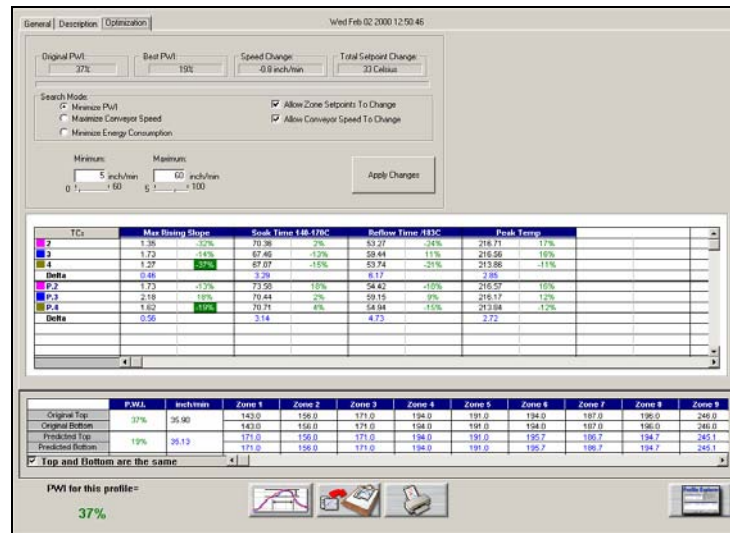


Figure 65: Optimization Tab

The *Optimization* Tab allows you to set the search functions of the *Navigator* Option. The *Navigator* will search through millions of set point and conveyor speed combinations to find the optimal setting for each product. This optimization is based on what options you select in this tab.

Original PWI – The *Process Window Index* for the original profile

Best PWI – The best *Process Window Index* that can be found based on the oven recipe optimization constraints selected.

Speed Change – The total change to the conveyor speed for the best oven recipe found.

Total Set point Change – The sum of all set point changes for the best oven recipe found.

Search Mode for Optimization

- **Minimize PWI** – Search for the combination of set point temperatures and conveyor speed that will minimize the *Process Window Index*.
- **Allow Zone Set points to Change** – This option will determine if *Navigator* will include zone set point changes when predicting new solutions.
- **Allow Conveyor Speed to Change** - Choose whether to allow *Navigator* to vary the conveyor speed. If you choose this feature, you can set the minimum and maximum speeds.
- **Maximize Conveyor Speed** – Search for the set point temperatures that will maximize conveyor speed.
- **Minimize Energy Consumption** – Optional *Power* Feature; Search for the oven settings that will minimize the power consumption of the oven by finding set point solutions with slower conveyor speeds and lower temperature settings.

Conveyor Speed Constraints

As long as the *Allow Conveyor Speed to Change* feature is selected, these options will be available.

Low – Select the minimum conveyor speed you would like *Navigator* to recommend for new products.

High - Select the maximum conveyor speed you would like *Navigator* to recommend for new products.

Manual Profile Prediction

The KIC 2000 software has automatic (*Navigator*), and *Manual Prediction* capabilities. The standard KIC 2000 software installation includes *Manual Prediction* capabilities.

Manual Prediction gives the user the flexibility to easily predict changes to the oven settings (temperature settings, conveyor speed), and view the results without having to spend the time actually running the profile. This feature is very helpful to the user, minimizing the time spent fine tuning or developing a thermal profile.

Original/Predicted set points – Manual Prediction

	P.W.I.	inch/min	Zone 1	Zone 2	Zone 3
Original Top	47%	49.2	220.0	260.0	290.0
Original Bottom			220.0	260.0	260.0
Predicted Top	47%	49.2	220.0	260.0	290.0
Predicted Bottom			220.0	260.0	260.0

Figure 66

Original/Predicted set points – Navigator (Optional)

	P.W.I.	inch/min	Zone 1	Zone 2	Zone 3
Original Top	47%	49.2	220.0	260.0	290.0
Original Bottom			220.0	260.0	260.0
Predicted Top	28%	49.2	220.7	256.1	284.5
Predicted Bottom			220.7	256.1	254.5

Figure 67

This is an example of how the KIC 2000 software (*standard* and with *Navigator*) lists the *PWI*, and oven settings for the profile. This table is divided into the *original* section (top), and the *Predicted* section (bottom). See Figure 66.

The *original* values represent the oven settings at the time the profile was run. The *predicted* values represent the prediction results as determined by the *Navigator* software.

If you purchased the *Navigator* software option, the KIC 2000 software will automatically generate results that are best suited for the selected *Process Window*. In the event you wish to modify the prediction results of the *Navigator*, you can do so. See Figure 68.

To predict changes to the oven settings, or modify the *Navigator* prediction results, click on the zone you wish to change. In the example below, zone 1 has been selected. See Figure # 68.

	P.W.I.	inch/min	Zone 1	Zone 2	Zone 3
Original Top	47%	49.2	220.0	260.0	290.0
Original Bottom			220.0	260.0	260.0
Predicted Top	47%	49.2	220.0	260.0	290.0
Predicted Bottom			220.0	260.0	260.0

Figure 68

Type the new temperature setting, and then press *Enter*. The *Navigator* will predict the results of that change, and then automatically update the *PWI*, *predicted Statistics*, and the profile graph. The new predicted results will be displayed on the graph in a dotted-line format. This format enables the user to easily determine the difference between the *original* and *predicted* profiles. See Figure 69.

Profile Graph Display

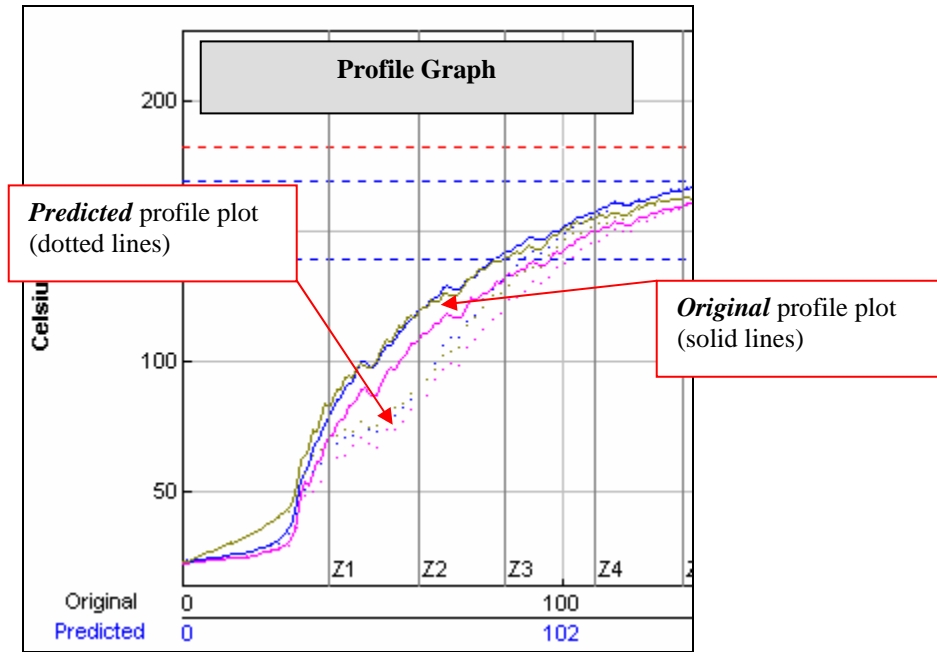


Figure 69: Graph Display

The *PWI* for the profile is displayed in the bottom-Left corner of this screen. If the measured *PWI* is below 100%, the value will be displayed in a Green font. See Figure 70. If the measured *PWI* is 100% or higher, the value will be displayed in a Red font. See Figure 71.

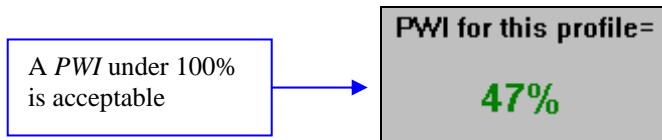


Figure 70: PWI In-Spec

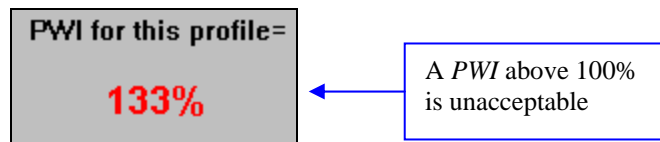


Figure 71: PWI Out-of-Spec

This display method enables the user to easily identify if the profile is in or out of spec.

Graph Controller

The *Graph Controller* allows the user to modify the view of the KIC 2000-profile graph. To open the *Graph Controller*, Left-click on the TC column header in the *Statistics* table or Double-Left-click, anywhere just outside the profile graph.

Auto Scale – The *Auto Scale* feature will automatically adjust the X, and Y axis scales to fit all of the data in the profile graph. When the *Auto Scale* feature is disabled, the user must manually input the minimum and maximum scale settings for the X, and Y axis scale of the profile graph.

Selecting Thermocouples to View

The TC's section is a list of the thermocouples used for the profile. By selecting *All* you are selecting that all the thermocouples used for the original profile will be displayed on the profile graph. In the event that you wish to view the profile without a particular or multiple thermocouples, you can deselect individual thermocouples, or deselect the *All* check box, and choose only the thermocouples you wish to view.

Deselecting Thermocouples

If a thermocouple has become disconnected during the profile, the profile results (PWI) may be affected to due above normal peak temperatures and such. This situation may cause the profile PWI value to be artificially inflated due to bad data. In the event a single or multiple thermocouples become disconnected from the product during the profile, you can deselect the affected thermocouple(s). The KIC 2000 software will recalculate the PWI, and update the profile statistics based on the remaining thermocouples selected. You must select at least one product thermocouple.

Grid – Enables/disables the view of the X, and Y-Axis scales.

Reference Lines – Enables the view of *Reference Lines* displayed on the profile graph. These lines represent any temperatures referenced in the selected *Process Window*.

Zone Lines – Enables the view for the oven zone lines on the profile graph.

Predicted TCs Only - Removes the Original profile plot form view, displaying only the prediction profile plot on the graph.

Zero Decimal – When viewing the Pointer tool, this setting enables or disables the decimal display. When unchecked, the software will display one decimal point.

Internal Temp – Enables the view of the *KIC profiler's* internal temperature profile plot on the graph.

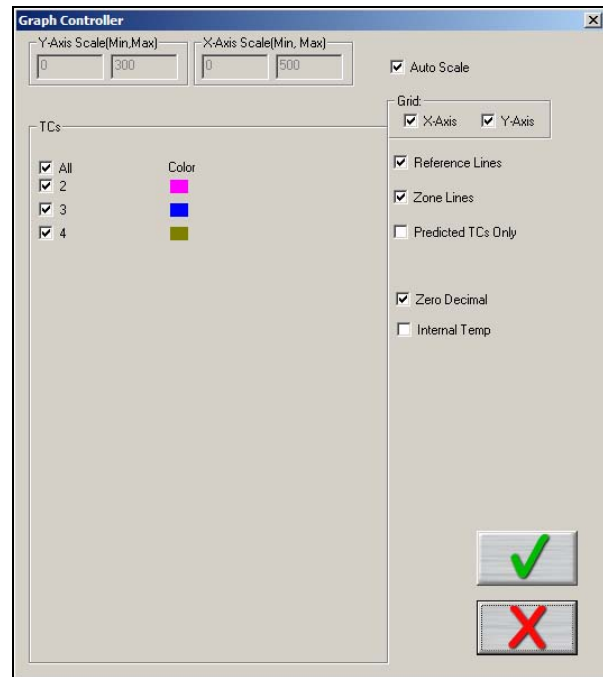


Figure 72: Graph Controller

Automatic Calculation of Delta T + Delta (or range) for all Stats

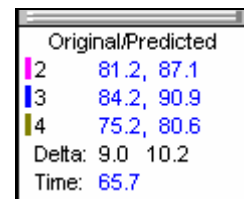
The software will automatically calculate, and display in the statistical chart, the Delta for both the original and predicted profile data for all TC's for all *Statistics*. See Figure 73. This is the range of the highest to the lowest value for any given specification. This information is strictly being displayed and is not factored in to the *PWI* value and is not used in *the Navigator* or *Auto-focus* calculations. **Note:** For more information on minimizing the Delta T, please refer to the Application Note on our web site at www.kicthermal.com under the "Library" section: [AN#20001 - Minimizing Reflow Temperature Differentials \(\$\Delta T\$ \) on Electronic Assemblies Using the KIC Navigator](#).

Pointer Tool

You can also view the Delta T (ΔT), or Delta Temperature, at specific points across the profile by right mouse clicking on the graph. This will bring up a Pointer and a chart will appear in the upper left corner of the graph. See Figure 73.

Wherever the pointer is moved across the profile, the following data will be displayed:

- The first column is the actual temperature for each TC.
- The second column is the temperature of the predicted profile data – based on set point or belt speed changes.
- The Delta T for both actual and predicted TC data.
- The time during the profile at which the pointer is placed



	Original	Predicted
2	81.2	87.1
3	84.2	90.9
4	75.2	80.6

Delta: 9.0 10.2
Time: 65.7

Figure 73: Graph Pointer

Profile Screen Buttons

There are four buttons at the bottom of the profile screen.

Edit/Define Process Window – Choose this button to either view or edit the process specification(s) for the product used in this profile.

Copy to clipboard – Choose this button to copy the profile data to the windows clipboard. You can then paste the data to a different application.

Print – Choose this button to print a copy of the profile that is currently on your screen.

Green Check /Profile Explorer button– When finished viewing or analyzing the profile select this button to either run another profile with this product or return to the *KIC 2000* main menu. You will be returned to the *Profile Explorer* if the profile was opened from there.

Upon Exiting the Graph screen

Do you want to run another profile with this product?
See Figure 74.

If you select **No**, you will be returned to the *KIC 2000* main screen or the *Profile Explorer* if the profile was originally opened from there.

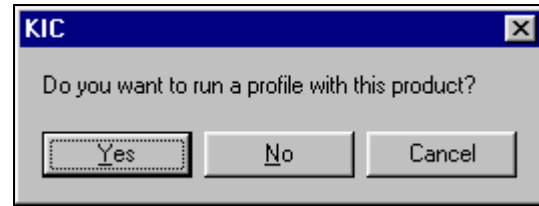


Figure 74

If you select **Yes**, you will need to choose from the *Original*, or *Predicted* recipe settings. See Figure 75.

Original – The same recipe settings used when this profile was originally run.

Predicted - The recipe settings as predicted by the *Navigator* option, or a standard prediction manually input by the user.

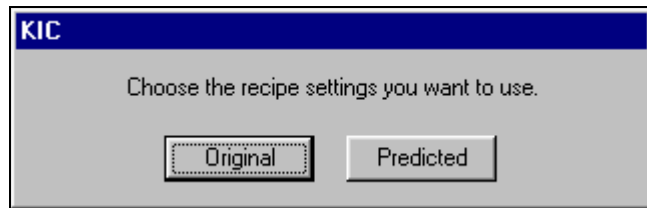


Figure 75

For both the *original* and *predicted* recipe settings, the software will automatically send the selected recipe information to the oven controller. If there is no communication between the *KIC 2000* software and the Oven controller, the *KIC 2000* will display a dialog box showing the recipe information. The user must manually enter this recipe information in the oven control software. See Figure 76.

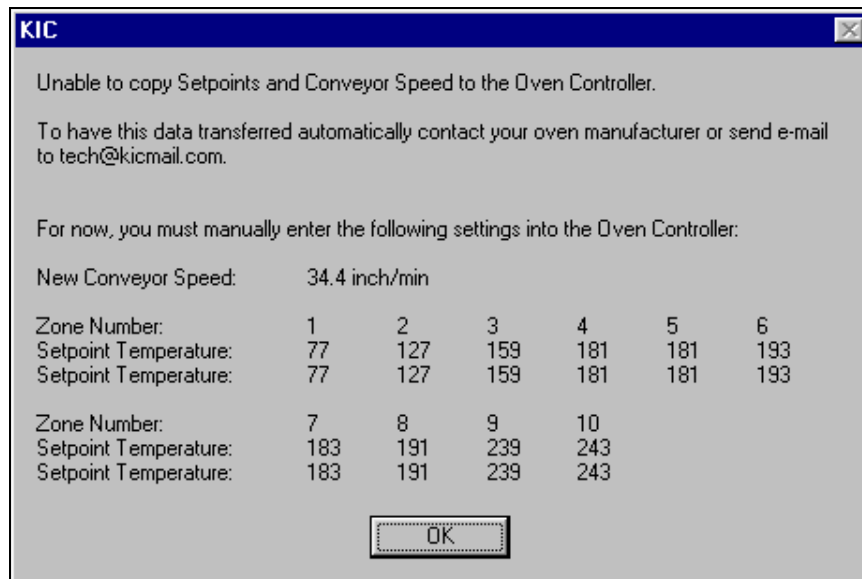


Figure 76

KIC 2000 software will automatically apply the changes to the *Run a Profile –Enter Set points screen*. You will exit to the *Run a Profile –Enter Set points screen*. If you are running on the oven controller PC, and the oven is compatible with the *KIC 2000* software the oven recipe will automatically be updated.

Saving changes to the profile:

Any changes to the *Description Notes* or the *Process Window* can be saved with the profile. See Figure 77. This will permanently update this profile with the changes. Changes to the *Process Window* saved here only save the changes with the profile. To save the changes to *Process Window* file see next dialog box. See Figure 78.

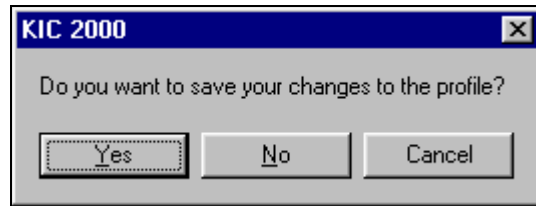


Figure 77

Saving changes to the *Process Window*:

If you have made changes to the *Process Window* from the Graph screen you can save these changes when you exit the graph screen. The *Process Window* will permanently have these changes whenever it is used to profile from this point forward.

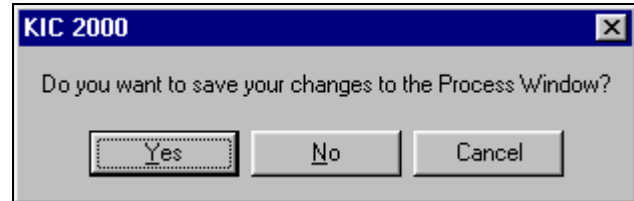


Figure 78

The *KIC 2000* software will take you to the *Edit Process Window* screen in order to save the changes that you have made.

The first dialog – “Do you want to run a profile with this product?” will appear each time you exit the graph screen. Click on **No** if you do not wish to profile.

You will be sent back to the *KIC 2000* Main menu if you had just completed running a profile. If you opened the profile from the *Profile Explorer* you will be returned to the *Profile Explorer*. The other two dialogs will only appear if changes are made to the *Description* notes or *Process Window*.

KIC 2000 Profile Explorer

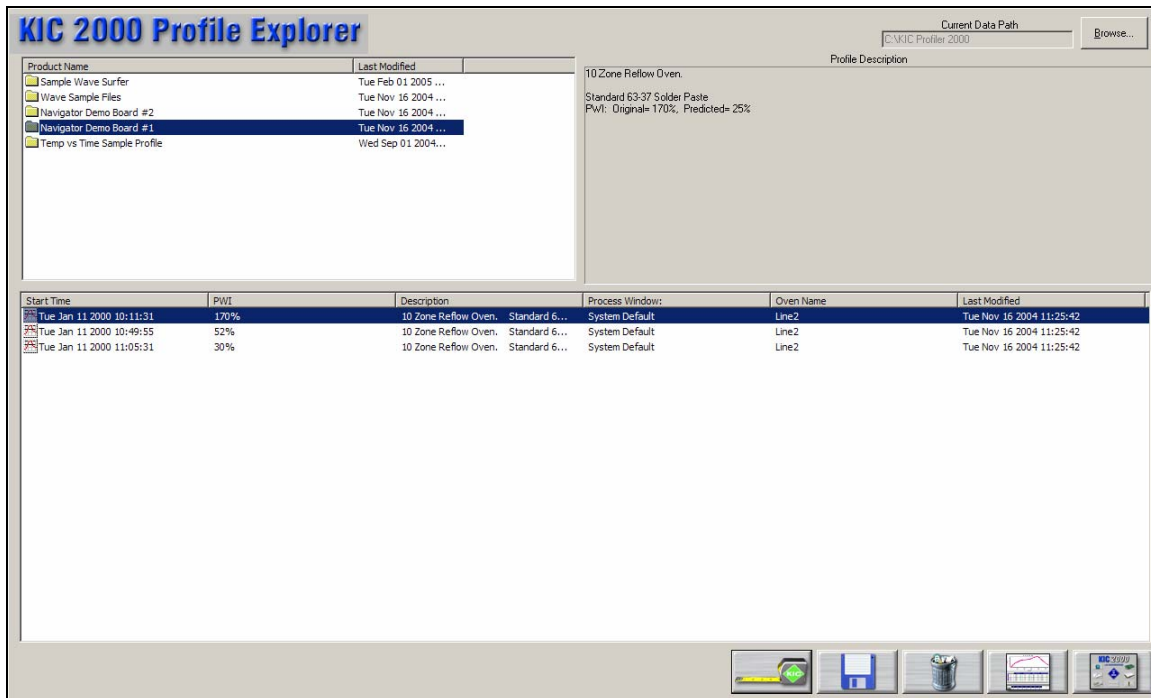


Figure 79

The KIC *Profile Explorer* is a powerful and simple data file management tool. For each unique product name you use when profiling, the KIC 2000 software will create a folder with the same name. Under that folder all the profiles run using that product name are saved. See Figure 79.

- **The list of product folders is in the upper left of the *Profile Explorer*.** Click on a folder to display the profiles in the profile section at the bottom.
- **The profile section can be sorted by click on any of the column headers.** Single clicking on a profile will display the *Profile Description* in the upper-Right corner.
- Double clicking on the profile will display the graph and statistics for that profile.
- Clicking on the *Display Graph...* button can also do this.

The default data path can be changed, see page 118 for details.

Buttons

Product Dimensions button (Tape measure) For *Auto-Focus* users, allows the user to edit the length, width, and weight of the selected product. Whenever the product dimensions are changed in the *Profile Explorer*, all the profiles in the directory will be updated automatically.

Save button with the Blue floppy disk allows you to save a profile to another folder or to a floppy disk.

Delete button (trashcan) allows you to delete the selected profile.

Display Profile button – displays the profile for viewing or analysis.

Main Menu button in the lower right corner returns you to the **Main Menu**.

Inserting KIC 2000 data files from an outside source

KIC 2000 data files can be sent or received via floppy disk or email. In order to view them using the *KIC 2000* software, copy them to the **KIC Profiler 2000\Profiles** folder using Windows Explorer.

The next time you enter the *KIC 2000-Profile Explorer* screen the software will automatically create folders for those profiles based on the profile name and move the profiles to the correct folders.

Printing

The *KIC 2000* software will print profiles only from within the profile display screens. There are two print formats available. Print Format #1 is the default format used.

Select the print button at the bottom of the screen to print a profile. A print dialog box will appear. See Figure 80.

Print Format #1

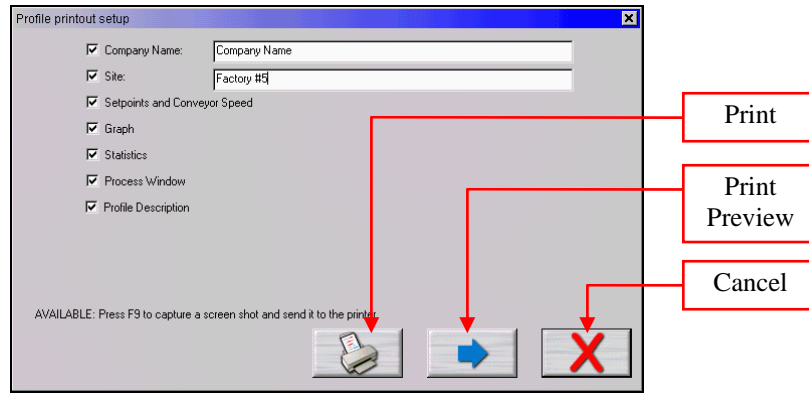


Figure 80: Print Options Screen – Print Format #1

Enter the “Company Name” and “Site ID.” Check the items you wish to include on your profile printout. Press the **Print** button to print the report.

Press the **Print Preview Button** to display a preview of the report. See Figure 81.

Print Format # 1 Print Preview

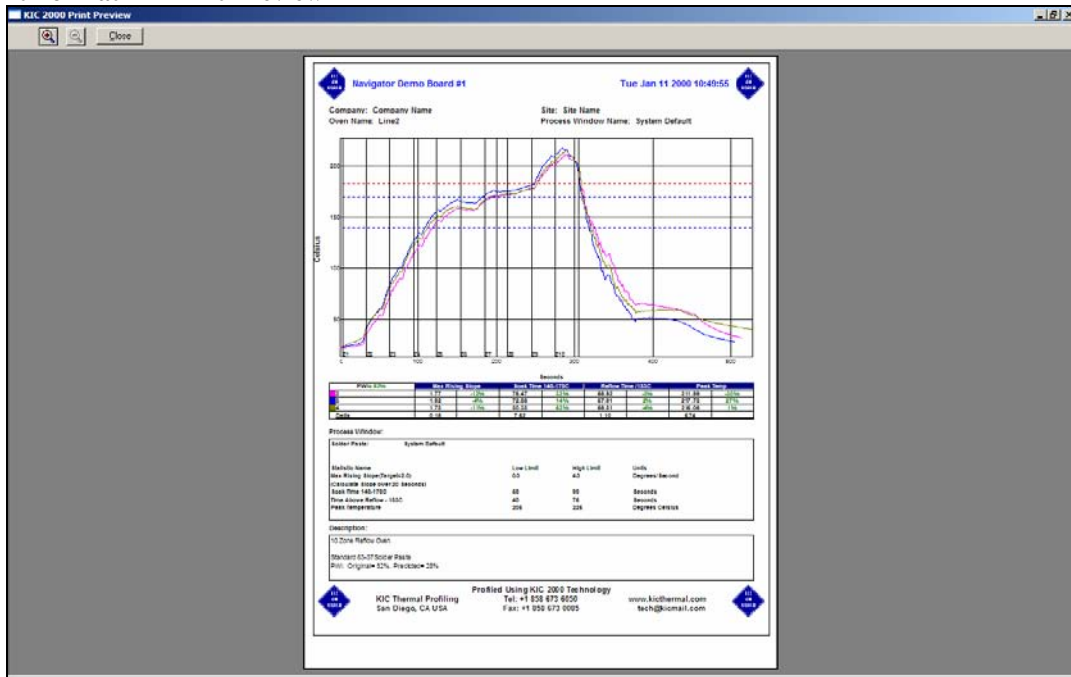


Figure 81:

Sample Print Preview for Report Format #1. Report is printed in Portrait layout. Includes the Company Name, Site ID, Date, Statistics, Profile Information, Set Points, Profile Graph, Statistic Limits and Profile Description.

Print Format #2

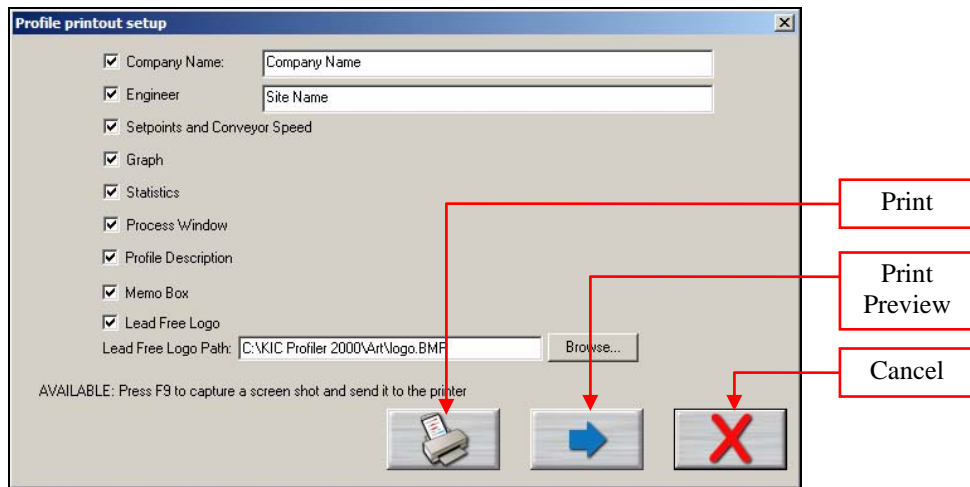


Figure 82: Print Options Screen – Print Format #2

Enter the “Company Name” and “Engineer’s name”. Check the items you wish to include on your profile printout. See Figure 82.

Press the **Print** button to print the report.

Press the **Print Preview Button** to display a preview of the report. See Figure 83.

Below are the additional options available with Print Format #2:

Memo Box –Enables/Disables a Memo Box area for Draft, Review and Approval Signatures and Dates.

Lead Free Logo – Enables/Disables the Lead-Free Logo display area.

Lead Free Logo Path – When “Lead Free Logo” is enabled, specify the path to any BMP image file that you want to appear in the Lead Free Logo display area on the report. The default image is the KIC Lead-Free logo image

Print For mat # 2 Print Preview

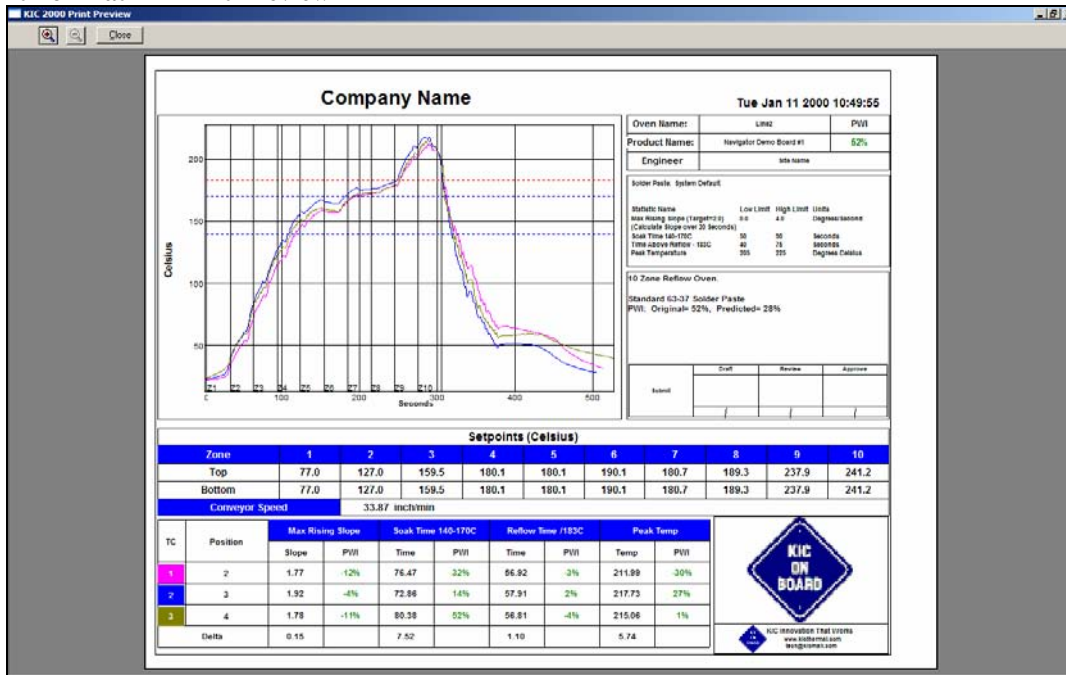


Figure 83:
Sample Print Preview for Report Format #2. Report is printed in Landscape layout. Includes the Company Name, Engineer, Date, Statistics, Process Window, Set Points, Profile Graph, Profile Description, Lead-Free Logo Area and Memo Box Area

Optionally, you can print the contents of any screen in the KIC 2000 software by pressing **F9** on your keyboard. The **F9** function will not work while viewing the *Profile Printout Setup* dialog box.

Before printing make sure you defined a printer for use with Windows.

Changing Print Formats

The default Print Format is #1 (Portrait). Includes the Company Name, Site ID, Date, Statistics, Profile Information, Set Points, Profile Graph, Statistic Limits and Profile Description.

You can change the default format by editing a KIC 2000 configuration file.

To change Print formats follow these steps:

1. Close the KIC 2000 software if open.
2. Using Windows Explorer, find and open the file: C:\KIC Profiler 2000\Log\GControl.kiccfg
3. Find the command line that reads:
[PRINT_FORMAT]
AlternativePrintFormat=0
4. Change the command line to read:
[PRINT_FORMAT]
AlternativePrintFormat=1
5. Save and exit the file: C:\KIC Profiler 2000\Log\GControl.kiccfg
6. Restart the KIC 2000 software, the new print format will be active. Confirm by printing a profile.

Wave Solder Profiling

The *SlimKIC 2000* and *KIC Explorer* profiles can be used to measure wave solder profiles. Profiling wave solder machines using a *KIC profiler* is very similar to profiling a solder reflow oven. The *KIC 2000* software will guide you through the profiling process.

KIC does not recommend installing this software on an oven controller PC if you plan on running wave solder profiles. Contact KIC for instructions should the need arise. tech@kicmail.com.

Wave Surfer Profiling Device

KIC offers a wave solder accessory for the *SlimKIC 2000* called the *Wave Surfer*. See Figure 84.

The *Wave Surfer* has embedded thermocouples that give wave specific data including conveyor speed each time you run it through your wave solder machine.

Using the *KIC 2000* software *Wave Surfer* users can collect profile and wave data and using the *Navigator* option optimize their process.

The *Wave Surfer* simplifies wave soldering profiling. The device is used to routinely check the wave machine. Using the *Process Window Index*, the machines performance is measured each time a pass is made based on the user selected *Process Window*.



Figure 84: Wave Surfer Device

KIC 2000 software Wave Solder Profiling

This section will outline the steps necessary to setup and run a wave solder profile using your *KIC Profiler* and *KIC 2000* software. This section is written assuming the user has a basic understanding of the *KIC 2000* software and its functions before attempting to profile a wave solder machine.

Global Preferences

Unit of Measure - Wave solder machines generally use the Fahrenheit scale for preheat and solder pot temperature measurements. If necessary change the temperature units to Fahrenheit.

Product Start Temperature – This temperature setting can be changed. It is up to the user to determine what temperature setting will work best for their process.

Maximum Product Temperature at Start of Profile – This setting will determine the maximum product temperature before the software will allow the user to start a profile. If any of the thermocouples connected to the *KIC Profiler* or your product measure above this setting, the software will not allow the user proceed. You will be prompted with a message stating that *one of the selected TC's is not reading valid temperatures*. You will have to wait till the thermocouple or the object your thermocouples are connected to cools below this temperature setting before the *KIC 2000* will allow you to proceed. This software feature helps the user to collect consistent profile data by always beginning the profile with the same or nearly the same product temperatures.

The *KIC 2000* software also uses this setting to determine the profile start - temperature trigger value. The profile start–temperature trigger is always set 2°C above the “Maximum product temperature at start of profile”. If the *Maximum product temperature at start of profile* is set to 31°C, the profile start–temperature trigger is automatically set to 33°C, which is the default setting. When the *Air TC* reads above 33°C, the profile will begin.

Process Window

The *KIC 2000* software currently does not contain a list of fluxes or materials used specifically for wave soldering; only a list of solder pastes generally associated with solder reflow. In most situations, users defining a *Process Window* for a wave solder process will have to define their own specifications.

Select the line item at the top of the list- *Define your own spec* from the *Solder paste Menu*. You will be automatically directed to the *Edit Specs* window where you can enter your unique process specifications. Enter your process specifications, when finished; select the *Green check* button.

If you have followed the above directions, you should be looking at the *Process Window* screen. If you are satisfied with the settings and wish to apply these specifications to all the thermocouples used, type a descriptive name in the top field and select the *Green check* button. Select Yes when prompted to save the *Process Window* file.

If you want to use different specifications for one or more thermocouples, you can do so.

Note: *When running wave solder profiles with the “wave on”, KIC Profilers utilize two Wave TC's in addition to the Air TC to collect wave specific data. The Wave TC's will connect to channels #2, 3 on the KIC profiler. See the “Connecting Wave TC's” section of this manual for details, page 58.*

Running a Wave Solder Profile

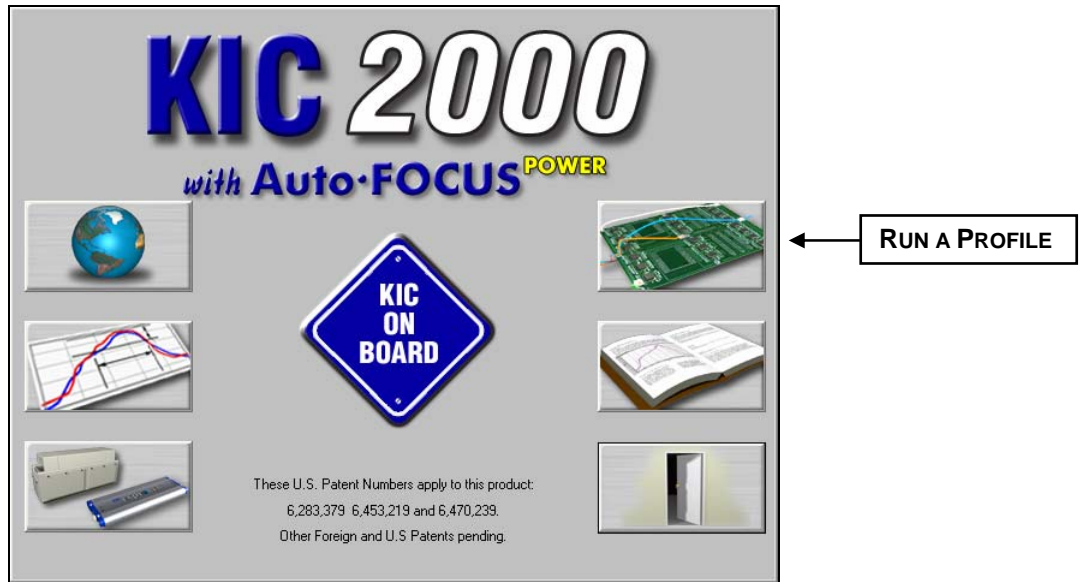


Figure 85: KIC 2000 Main Screen

From the *KIC 2000* main screen select the *Run a Profile* button. See Figure 85.

Name Product and Select Process Window/Application Type

Figure 86: Run a Profile Screen #1

- Select your *Product Name* from the list. If you're profiling a new product type the name.
- Select your *Process Window* from the list.
- Select your process type from the *Applications* list. The *KIC 2000* software profile and prediction results are based on this setting, it is imperative that you select the correct *Application* type. Failing to do so can affect the profile results. For wave solder select to run the profile with the wave On or Off.
 - If you select *Wave on*, the *KIC 2000* software will utilize two wave TC's in addition to the *Air TC*. The *Wave TC*'s will measure: wave dwell time and Parallelism when profiling with the wave on. The *Air TC* must be positioned to run through the wave(s).
 - If you select *Wave on*, the *KIC 2000* software will display preheat and wave profile data, but offer prediction results only for the pre-heat section of the profile.
 - If you select *Wave Off*, you will profile similar to *Solder Reflow*, be sure and turn the wave off.
 - If you purchased the *Wave Surfer* select *Wave Surfer* from the *Applications* list.
- Select your oven name from the list. If you're profiling on a new oven or machine, type the name in the "Oven Name" field.
- Optionally you can type notes or descriptions for this profile in the "Profile Description" field. These notes will be stored with the profile and can be edited later if necessary.

When you are finished with your selection, choose the *Forward Arrow* button to proceed. See Figure 86.

Entering Temperature Set Points and Conveyor Speed

If you typed a new oven name, the KIC 2000 software requires you to enter the number of heated zones or pre-heat zones in your wave solder machine. See Figure 87.

If your process requires different top and bottom set points, deselect the check box labeled *Top and Bottom set points are the same*. This will allow the user to enter different values for top and bottom heaters in each zone. If your oven has top and bottom heaters, but not in all of the heated zones, just enter the same value as the actual set point in that zone for both the top and bottom setting.

This is also where you will enter the temperature settings for each zone or pre-heater in your wave solder machine and the conveyor speed setting. In the field marked *Solder temperature* enter the setting for the solder pot temperature from your wave solder machine.

When you have finished entering this information select the *Forward Arrow* button to continue.

Product Name: My First Product

Enter Preheaters and Solder Wave(s) Setpoints and Conveyor Speed

Oven: _____

Number of Zones:

Top and Bottom Setpoints are the same

Zone	1	2	3
Top	300	330	330
Bottom	300	330	330

Fahrenheit Solder Temperature:

Conveyor Speed: feet/minute

To have the oven setpoints and conveyor speed automatically transfer to this screen, please contact Your oven manufacturer, or KIC at tech@kicmail.com

Figure 87: Run a Profile Screen #2

Zone length, Minimum and Maximum Temperature settings

If you typed a new oven name, the KIC 2000 software also requires you to enter the length of each zone as well as the minimum and maximum zone temperature settings. This information will help the KIC 2000 software narrow the possibilities of prediction results that your oven can actually achieve. See Figure 88.

For wave solder processes you are required to enter the distance from the end of the last preheat zone to the beginning of the main wave. Enter this value in the field labeled *Distance from end of last preheat zone to the main wave*.

Once you have finished entering this information select the *Forward Arrow* button to continue.

Product Name: My First Product

Verify the Length of Each Zone and the Minimum and Maximum Setpoint Temperatures

Oven:wave _____

Number of Zones:

All Zone Lengths are the same

Zone	1	2	3
Length (Inches)	24	24	24
Min Setpoint	100	100	100
Max Setpoint	600	600	600

Distance from end of last preheat zone to the main wave Inches

The total distance of all the zones must add up to the distance from the start of the first zone to the end of the last zone. If there is a space between zones, add half the space to each zone.

Figure 88: Run a Profile Screen #3

Connecting the Air TC

The next screen shows directions for attaching the *Air TC* to your product. It is important to follow these instructions. See Figure 89.

The *Air TC* starts and stops the profile automatically, measures the oven, and provides useful profile information.

In certain processes it may be beneficial to wrap the end of the *Air TC* with tape to give it more surface area.

KIC recommends wrapping the *Air TC* when profiling:

- Wave Solder.
- Anytime IR heat is present.

Wave Surfer

Wave Surfer users connect the designated thermocouples to the corresponding channels on the *SlimKIC 2000*.

Make sure the retainers holding the *SlimKIC 2000* are in place and secure. See Figure 90.

If any of the embedded thermocouples are damaged or show signs of wear replace them.

In addition to the instructions given, it is very important that you position the “Air TC” so that it touches the wave(s). The “Air TC must pass through the wave in order to provide accurate profile results. Of course if you are profiling a Wave Solder machine with the wave off, the Air TC position is not critical to the profile results.

Select the *Forward Arrow* button to continue.

Connecting Wave TC's

The next screen will depict thermocouple attachment for wave solder profiling with the wave on. The *KIC 2000* software utilizes two *Wave TC's* in addition to the *Air TC* to collect wave specific data. See Figure 91.

One *Wave TC* is placed on the Right side of the board and one on the Left side near the leading edge of the profile board.

KIC recommend using high temperature solder to connect both Wave TC's.

The wave TC's will measure -Wave Dwell time and Parallelism when profiling a wave solder machine with the wave on.

Select the *Forward Arrow* button to continue.

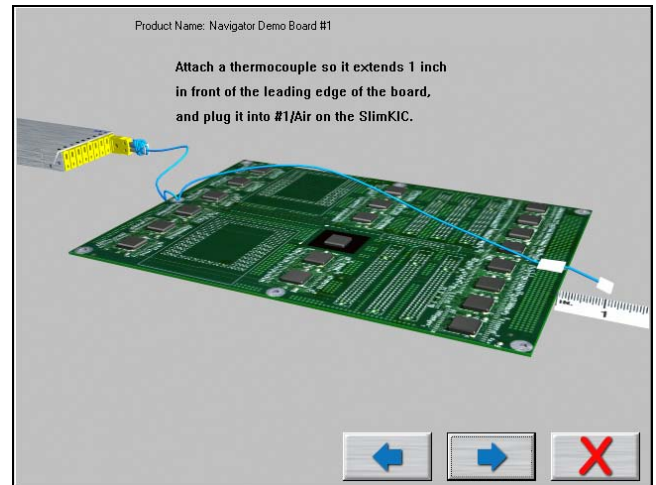


Figure 89: Run a Profile Screen #4 – No Wave Surfer

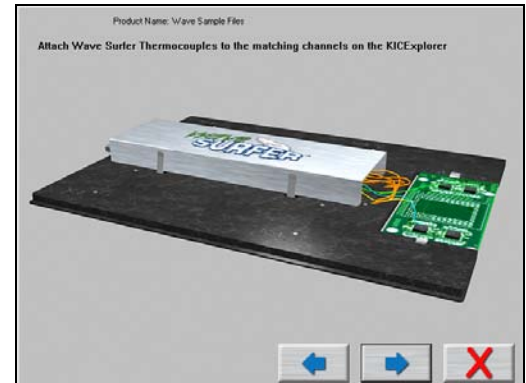


Figure 90: Run a Profile Screen #4 – Wave Surfer

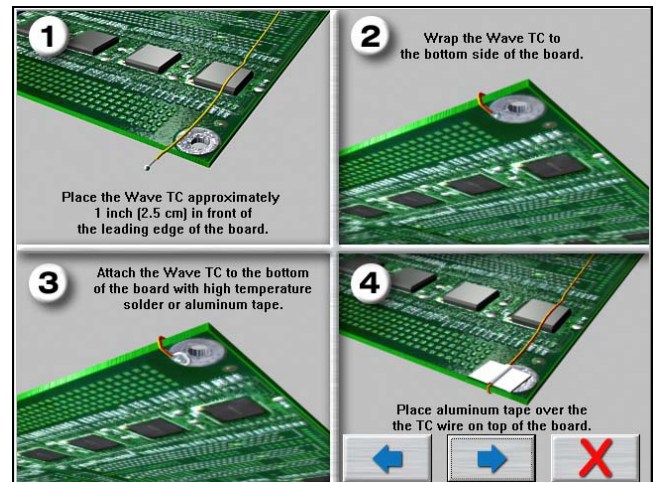


Figure 91: Run a Profile Screen #5

The next screen will depict the placement of the *Wave TC's* and instructs what slot/channel of the *KIC Profiler* to connect each *Wave TC* to. See Figure 92.

It is very important to follow these directions.

- Plug the Left-Wave TC into the #2 slot of the *KIC Profiler*.
- Plug the Right-Wave TC into the #3 slot of the *KIC Profiler*.

When you have properly connected your *Wave TC's*, select the *Forward Arrow* button to proceed.

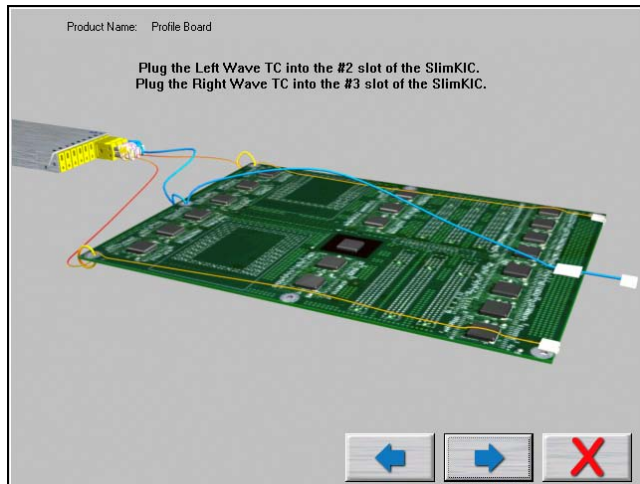


Figure 92: Run a Profile Screen #6 – Wave-On

Connecting Product TC's

The next screen will depict placement of the thermocouples used for profiling the product (*Product TC's*). See Figure 93.

Product TC's are connected to the product in key locations across the product. The selected locations need represent the highest and lowest- mass areas of the product or even specific temperature sensitive components.

Once you have connected your *Product TC's* to your product, connect them to the *KIC* profiler starting with slot or TC #4.

Select the *Forward Arrow* button to continue.

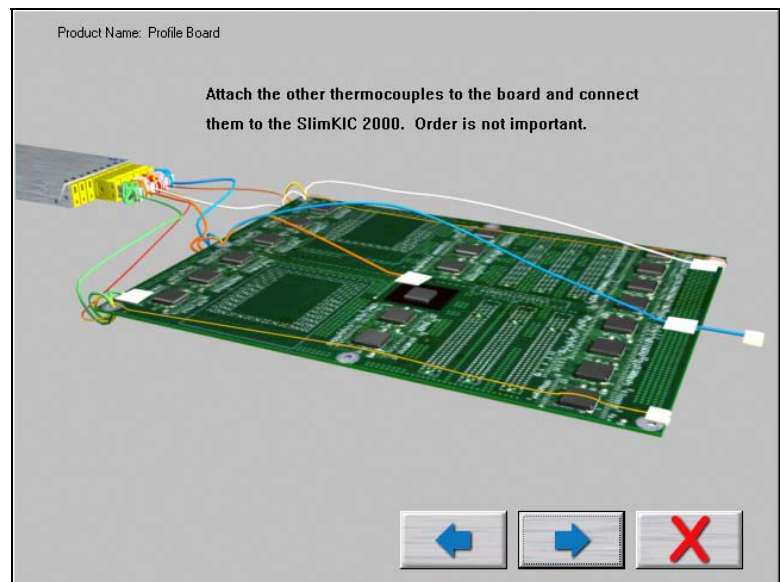


Figure 93: Run a Profile Screen #6

Selecting the thermocouples and starting a profile

This screen displays the live readings from the KIC profiler for all thermocouples selected, as long as the hardware is properly connected. See Figure 94. Make sure your KIC Profiler has a fresh battery and is powered on.

Selecting Thermocouples - To select a thermocouple, check the box next to the thermocouple number. The live temperature is displayed beneath each thermocouple label.

Thermocouple Labels - Optionally you can check the box to *Include thermocouple labels*. When this box is checked you can type a text label for each selected thermocouple. 20 character maximum.

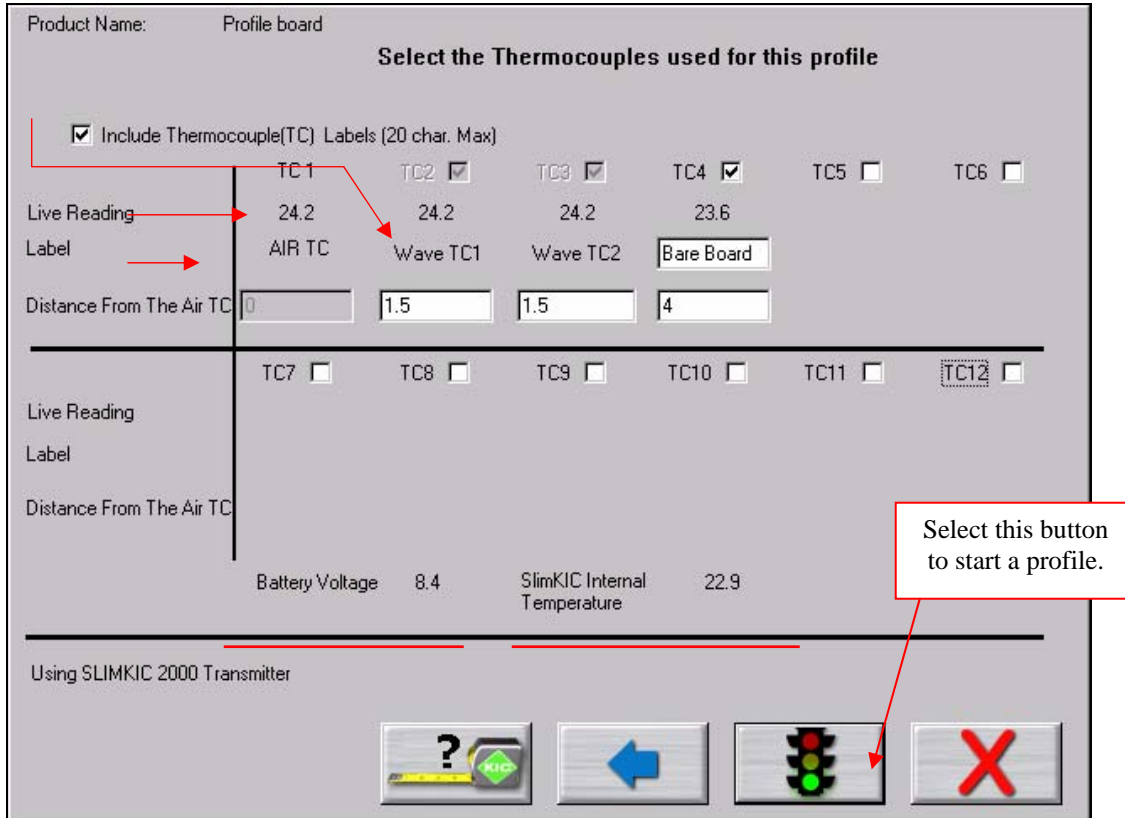


Figure 94: Run a Profile Screen #7

Distance from the Air TC – Measure and enter the distance from the *Air TC* to each thermocouple used, including the *Wave TC*'s.

Select the *Help Measurement* (Tape Measure Help) button for an example of how to correctly measure the distance from the *Air TC*. See Figure 95.

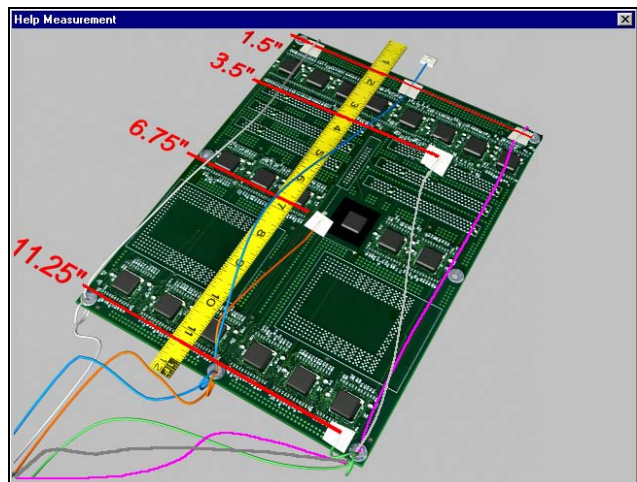


Figure 95: Wave-On TC measurements

Once you have selected your thermocouples, you are ready to profile.

Make sure your *KIC profiler* hardware is properly connected to the computer. You will be able to view the live readings for each selected thermocouple. If you don't see the live readings, the *KIC Profiler* hardware is not connected properly. Recheck the connections.

Select the *Start Profile* (Green traffic light) button to begin profiling.

The *KIC 2000* software requires that the selected thermocouples read valid temperatures below the *Maximum product temperature at start of profile* as set in the *Global Preferences* screen. The default setting is 31°C/88°C.

If any of the selected thermocouples read too high, the following message will appear:

See Figure 96.

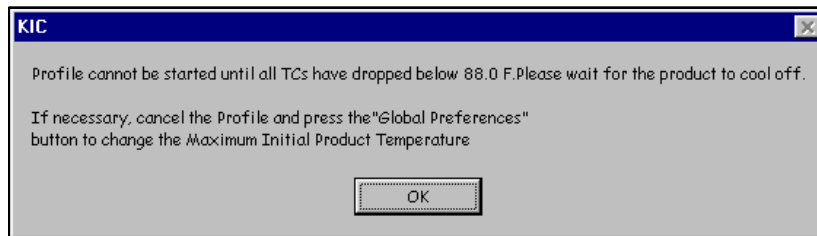


Figure 96

When the *KIC 2000* software detects valid temperatures for all of the selected thermocouples, it will allow you to start the profile.

In certain situations the KIC 2000 software may display other messages with directions in addition to what is outlined below. Read these messages and follow these directions carefully.

Next, the KIC 2000 software will ask you to verify the oven is stable. See Figure 97.

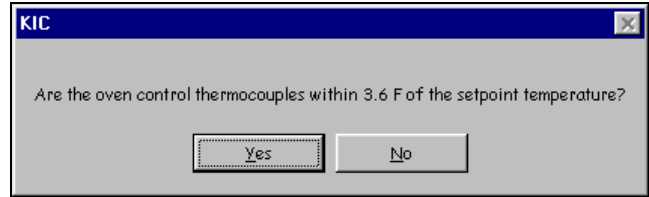


Figure 97

- **Yes** – The software will prompt you to put the *KIC Profiler* and the board in to the oven.
- **No** – The software will ask if the oven is getting closer to the set points. See Figure 98.
- **Yes** – The software will return to previous screen to wait till oven is ready, oven set points within 2.0°/3.6°F.
- **No** – The software will ask you to change the oven set point temperatures to the temperatures that the control thermocouples are currently reading, and then press OK.

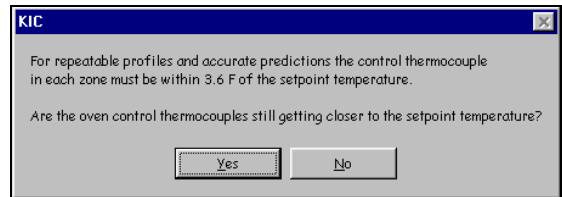


Figure 98

- The KIC 2000 software will have you enter the new set points and then recalculate the capability of your oven. Then continue forward through the *Thermocouple Attachment* screens until you get to the *Select thermocouples* screen. Then select the *Start Profile* button (Green traffic light) to start the profile, once the oven has stabilized.

If you selected **yes**, the software shows a picture of and instructs the user to put the *SlimKIC 2000* and the board into the wave machine, and then select the *Arrow Forward* button. See Figure 99.

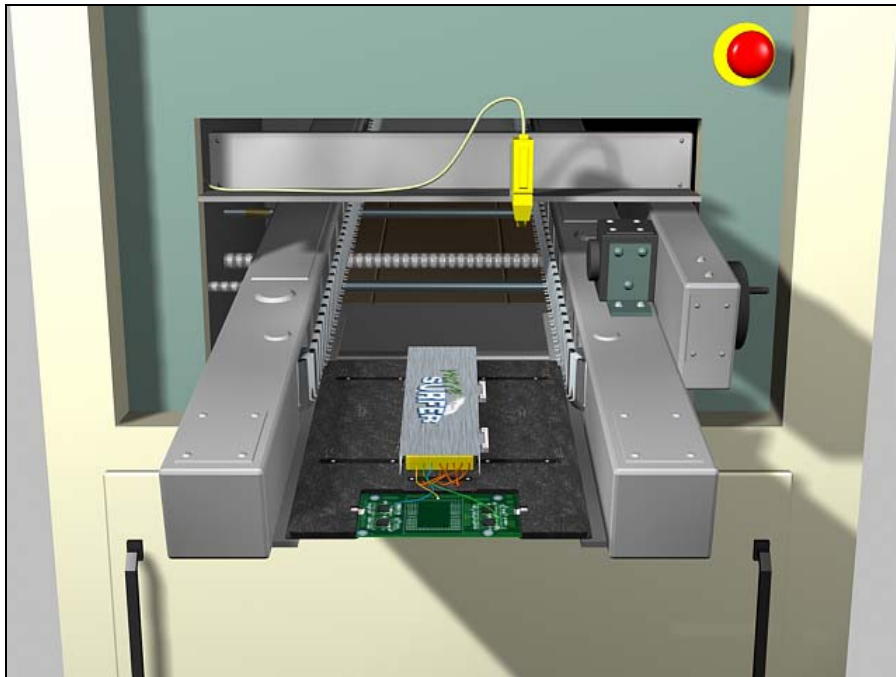


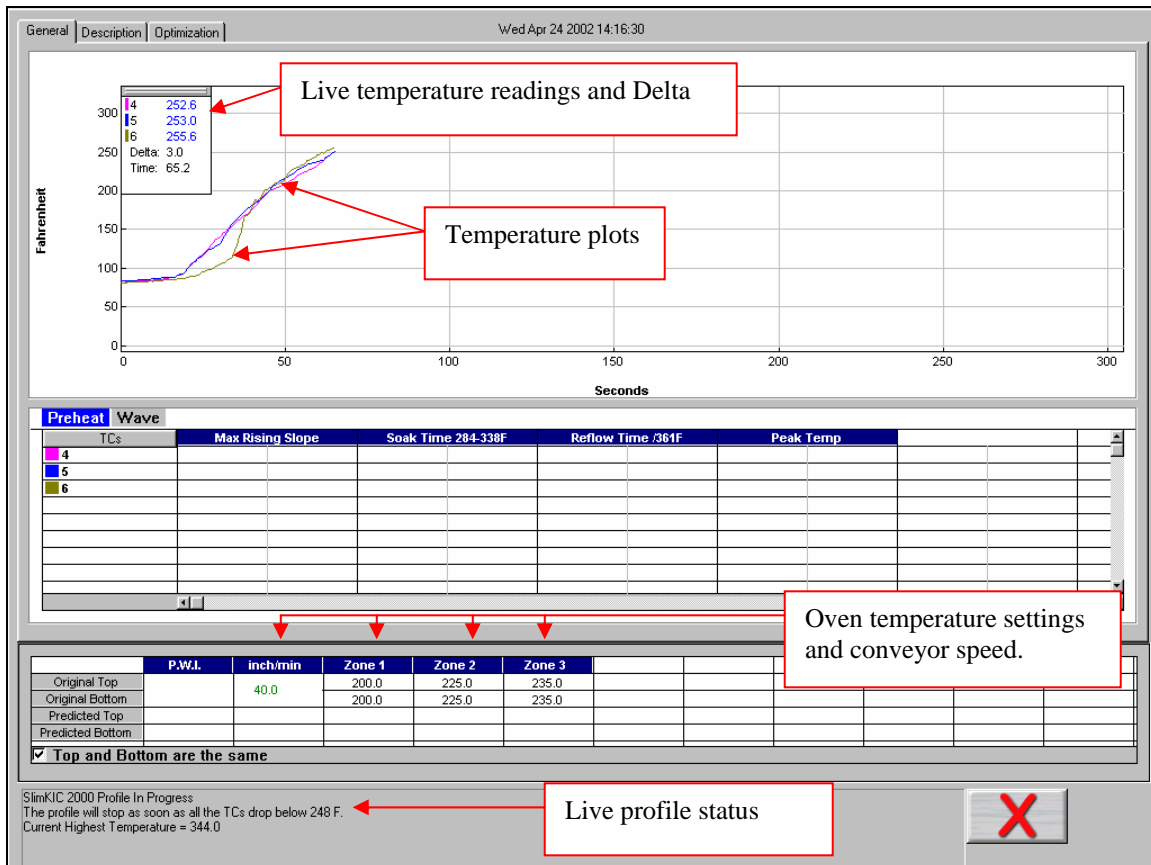
Figure 99: Wave Surfer Device loading into Wave machine

Next, the software will display the *Live Profile* graph.

Live Profile Graph Display

The live profile graph display is displayed only when using the *SlimKIC 2000* or *KIC Explorer RF* models. The live profile graph display will show the profile plot on the graph for the current profile that is running. See Figure 100.

If you have a SlimKIC 2000 or KIC Explorer-Data log model, you will not see a live profile display.



While the *KIC Profiler* is in the oven, and until the profile has ended, the software will continue to display the live profile graph. The other tabs at the top of the screen; *Description*, and *Optimization* are inaccessible. See Figure 100.

- The live profile is plotted on the graph.
- The current temperatures for each thermocouple and the Delta between them are displayed in a small window in the upper-Left hand corner of the profile graph. The elapsed time is also displayed.
- The current oven temperature set points and conveyor speed for this profile is displayed beneath the *Statistics table*.
- The profile status is continually updated throughout the profile. *SlimKIC 2000* and *KIC Explorer RF* models only.

The Live profile graph display will remain on your screen until the *KIC Profiler* has achieved the trigger temperature that determines the profile end.

Temperature Triggers

The *KIC 2000* software and profilers use temperature triggers to start and stop the profile automatically. The default *KIC 2000* temperature triggers are as follows: See Table 2.

Wave Solder-Wave On		Wave Solder-Wave Off	
Profile start	33°C/92°F	Profile start	33°C/92°F
Mid trigger	110°C/230°F	Mid trigger	130C/266F
Profile end	90°C/194°F	Profile end	110C/230F

Table 2

The default trigger values should be fine for most processes. The *Profile Start*-trigger is determined by the *Maximum product temperature at start of profile* setting in the *Global Preferences* screen. The start trigger value is always 2°C above this setting.

In the event that the mid-trigger, or end trigger values need to be changed, contact KIC Technical support, tech@kicmail.com.

Profile Retransmission

For users of the *SlimKIC 2000* or *KIC Explorer* profilers with *RF* transmit capability.

While the *KIC Profiler* transmits the live profile data to the *SlimKIC Receiver* or *KIC Explorer Base Station*; it simultaneously stores the profile data in its memory.

Once the *KIC Profiler* detects that all of the thermocouples have cooled below the profile-end trigger temperature, it will begin retransmitting the profile data to the *KIC 2000 software* via *RF*. The *KIC Profiler* will send the profile in *data packets*. The retransmission status is displayed at the bottom of the screen. See Figure 101.

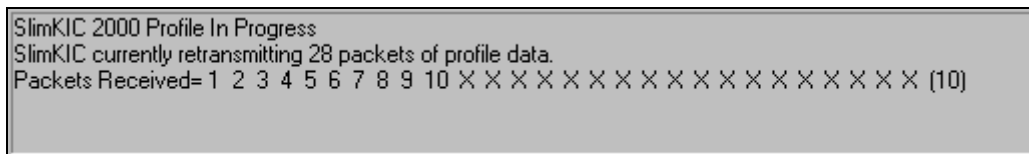


Figure 101: KIC Profiler RF model only

When all of the *data packets* have been received, the software will display a message asking you to turn the *KIC Profiler* off, choose OK. Failing to turn your *KIC Profiler* off will drain the battery.

Next, the *KIC 2000* software will automatically analyze the profile data and presents the profile and profile statistics. If you purchased the *Navigator* option, the predicted oven settings will be displayed as well.

If the *Air TC* or either *Wave TC* does not touch the wave(s), the *KIC 2000* software will display an error message: See Figure 102.

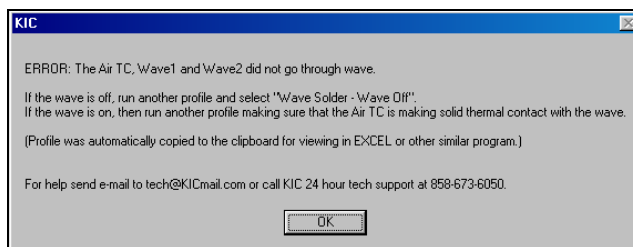


Figure 102