



WaveRIDER

Greetings from ECD–U!

The session will begin at the scheduled time.

As a courtesy to others on the session **PLEASE be sure:**

1. **Your audio is connected via phone or VoIP before the scheduled class time,**
2. **Your phone is on MUTE during the session.
Please do NOT put your phone on HOLD**

If you would like to ask a question, please use the “chat” feature on your Go-To-Meeting dialog

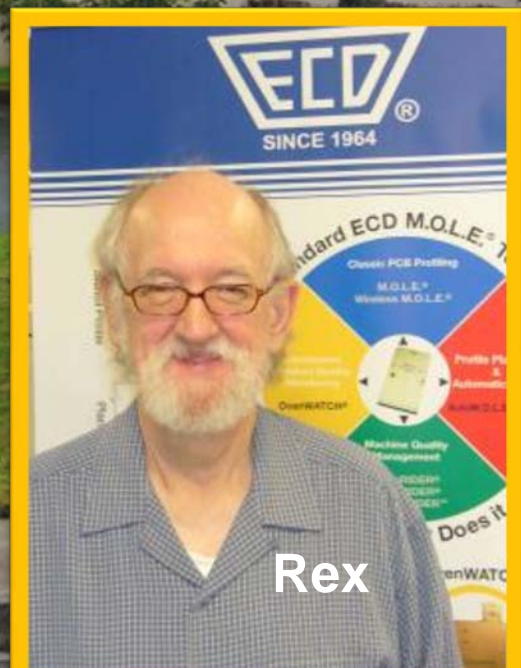
***This session may be recorded for training or distribution**



Mark



Paul



Rex

Where ECD - University

Product Design
& Development

New Product
Introduction

Production

Machine
Maintenance

Requirements

Characterization

Verification



Profile
Specification

Recipe
Creation

Product
Verification

Oven
Verification

ThQM

Profiling A to Z

Profiling 201

Verification 101

Profiling 101

M.A.P. 201

OvenRIDER®

M.A.P. 101

WaveRIDER®

Profiling 301

M.A.P. 301

OvenCHECKER®



WaveRIDER

Thermal Quality Management

Reduce Scrap and Increase Yields

Requirements

Characterization

Verification

Stage 1 Define Requirements

Why do we profile?

- Identify heat sensitive components
- Choose soldering technology

Stage 2 Machine Recipe Development

What is the recipe?

- Develop machine settings required for production that meet the above requirements
- Assure all solder joints experience the required temperature profile
- Assure sensitive components do not experience long term damage

Stage 3 Collect Data

How are we doing?

- Assure the temperature profile developed during characterization is being repeated
- Proof your thermal process is in control





WaveRIDER

Home of the M.O.L.E.O. Profile

The WaveRIDER® Part of ThQM

Stage 3 Verification: Measure the solder wave machine, instead of the assembly

- Run the WaveRIDER to capture the machines thermal and mechanical dynamics.
- Verify by regularly measuring the wave solder machine using WaveRIDER.
 - Beginning of Each Shift
 - During Each Assembly Changeover
 - After each P.M. Cycle





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Why verification is important...

- Confirms the machine performance
 - Preheat and solder wave temperatures
 - Solder wave dwell times
 - Conveyor speed

- Provides process metrics
 - Control and Capability charts (SPC)
 - Historical performance



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What does verification do for you...

- Gives you a marketing advantage over your competitor
- Peace of mind – proof your wave is in control
- Reduce rework and scrap caused by the solder process
- Eliminates using “golden boards” as the Verification tool
- Time savings over classic profile verification methods



WaveRIDER

The WaveRIDER® Pallet





WaveRIDER

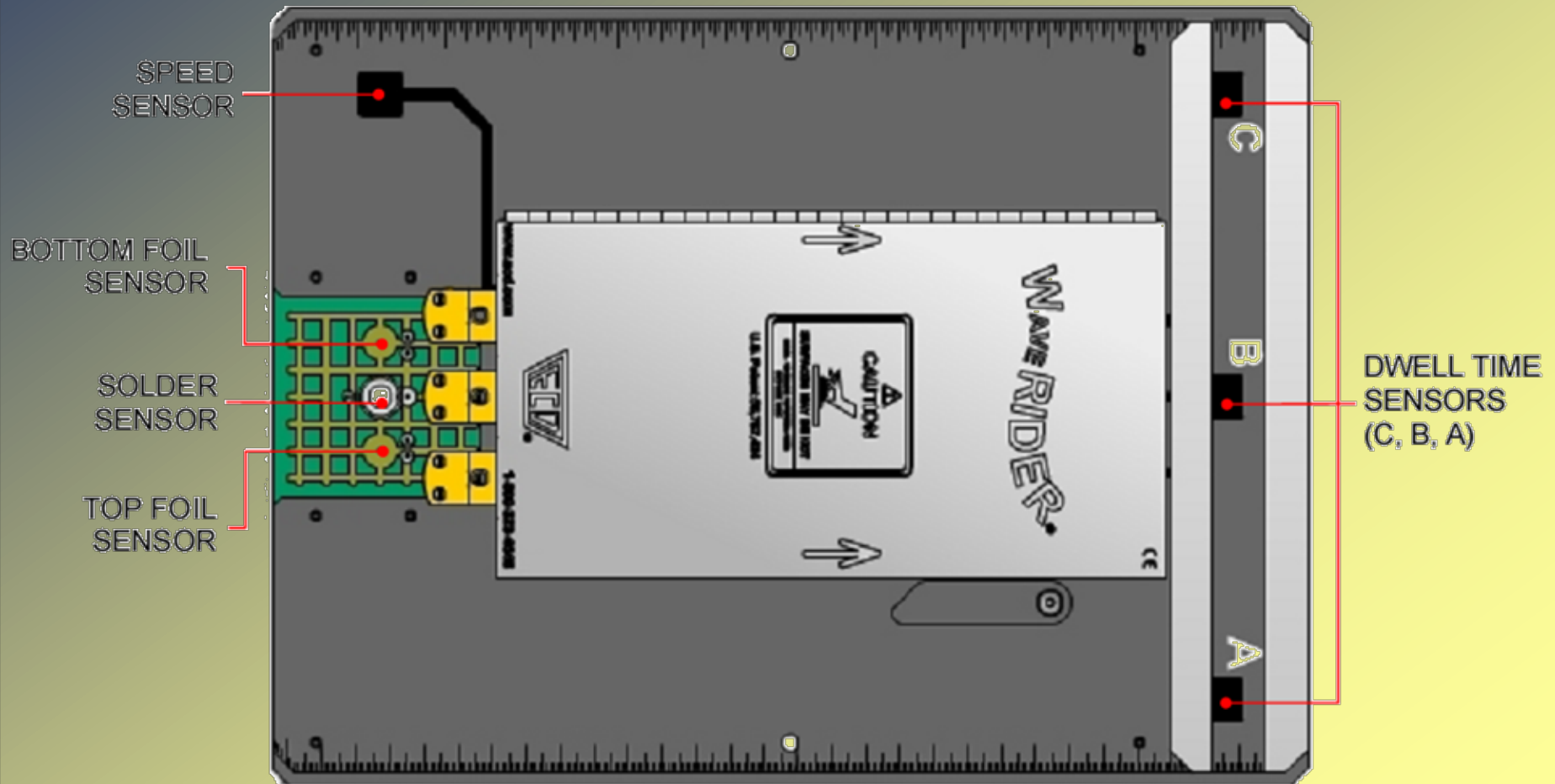
WaveRIDER Measurements

- Pot Contact Temperatures
- Delta Temp at Waves
- Dwell time in Waves: Left, Right & Center
- Contact Lengths: Left, Right & Center
- Immersion Depth
- Parallelism
- Conveyor Speed



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WaveRIDER® Sensors

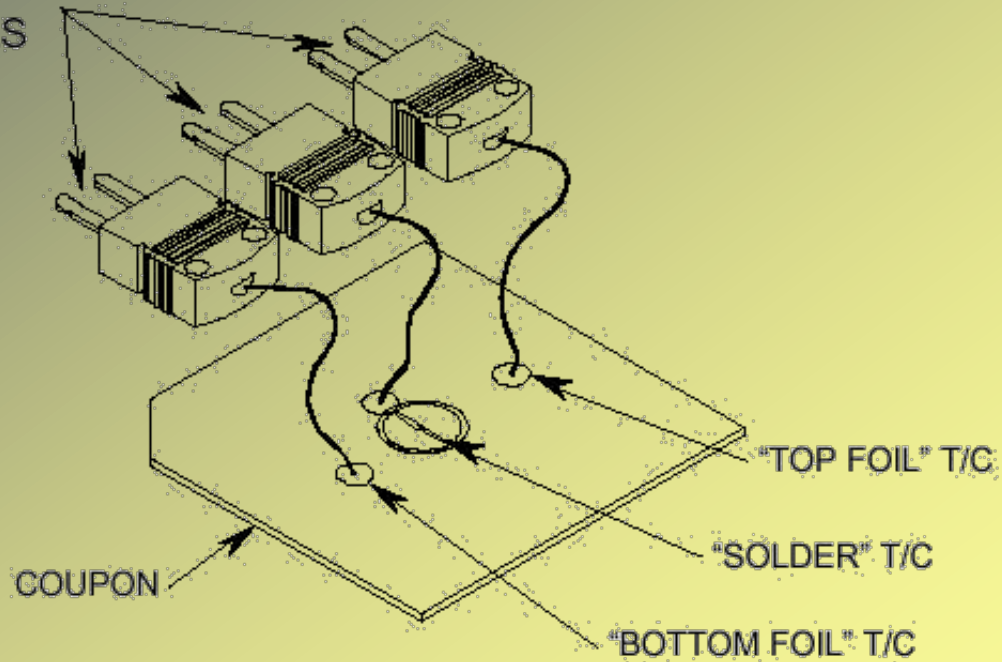




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WaveRIDER® Sensors

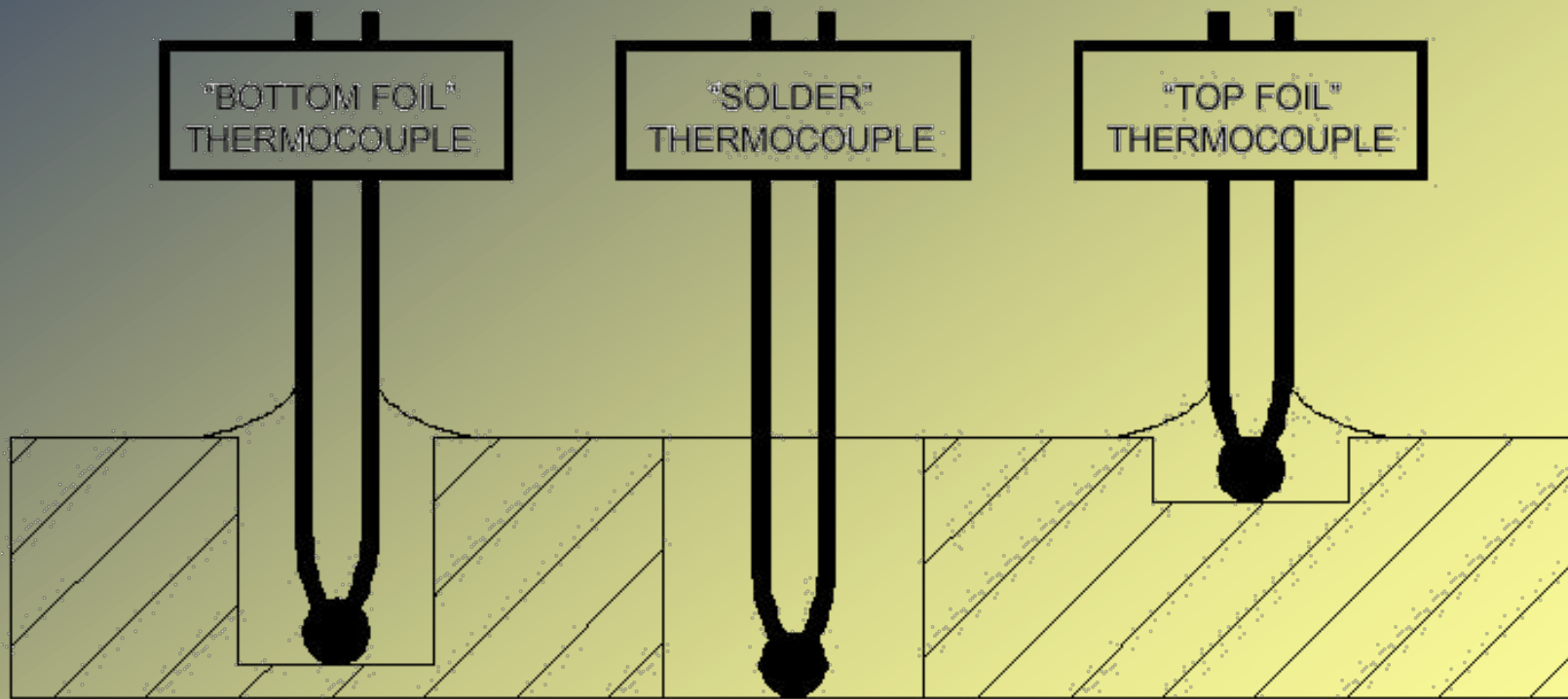
THREE TYPE "K"
THERMOCOUPLES





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WaveRIDER® Sensors





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WaveRIDER

Liquids are dynamic

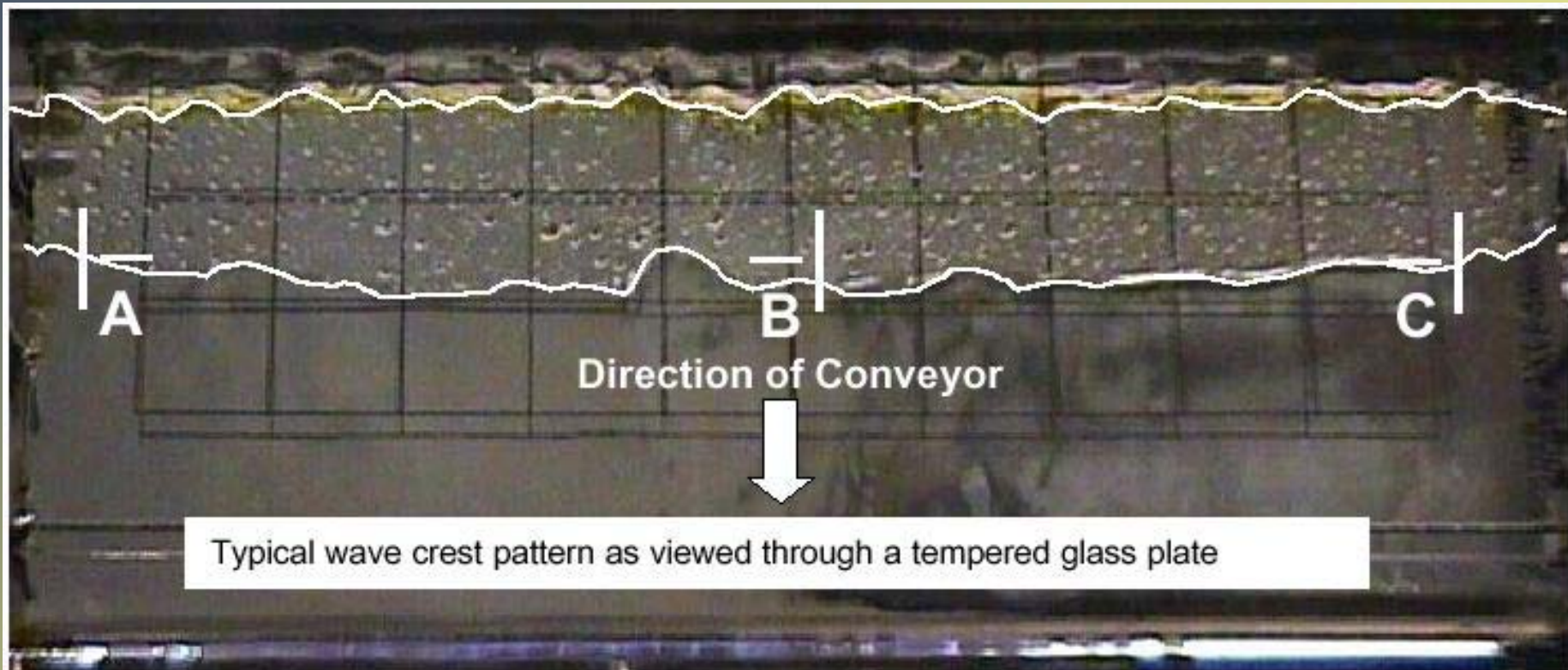




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Parallelism





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Let's jump to the software...



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WaveRIDER® SPC V4.03Beta3 - [WRSample.mwr]

File View WaveRIDER® Navigate Help

WR999999

Company: "ECD, Inc." File Tag: WR999999 Date: 05/05/99
 Machine: Part Number: Time: 20:23:17

Preheat		Chip Wave		Solder Wave	
Max Temp:	184 F	Delta T at Wave:	5 F	Delta T at Wave:	69 F
Min Temp:	73 F	Contact Temp:	443 F	Contact Temp:	488 F
Max Slope:	5.5 F/Sec	Dwell Time:	(A) 0.2 Sec	Dwell Time:	(A) 2.6 Sec
Conveyor:	5.12 Ft/Min		(B) 0.3 Sec		(B) 2.5 Sec
			(C) 0.2 Sec		(C) 2.0 Sec
M.O.L.E.®		Cont Length:	(A) 0.20 In	Cont Length:	(A) 2.66 In
			(B) 0.31 In		(B) 2.56 In
			(C) 0.20 In		(C) 2.05 In
Temp:	88 F			Immersion Depth:	0.10 In
Batt:	4.981 Volts	Parallelism:	0.0 Sec	Parallelism:	-0.6 Sec

Coupon Temperature Statistics

Ch	MinF	MaxF	Max (-) Slope		Max (+) Slope		Time
Top	72	257	-3.0	deg F/Sec	8.0	deg F/Sec	0.0 Sec>361 F
Solder	56	488					8.0 Sec>361 F
Bottom	71	269	-2.5	deg F/Sec	17.0	deg F/Sec	0.0 Sec>361 F

Welcome | WaveRIDER® Data | Spreadsheet | Profile | Admin | Chip Wave | Chip Parallelism | Solder Wave | Immersion Depth | Solder P

X=1083 Y=70F 03/18/01 HH:MM:SS



WaveRIDER

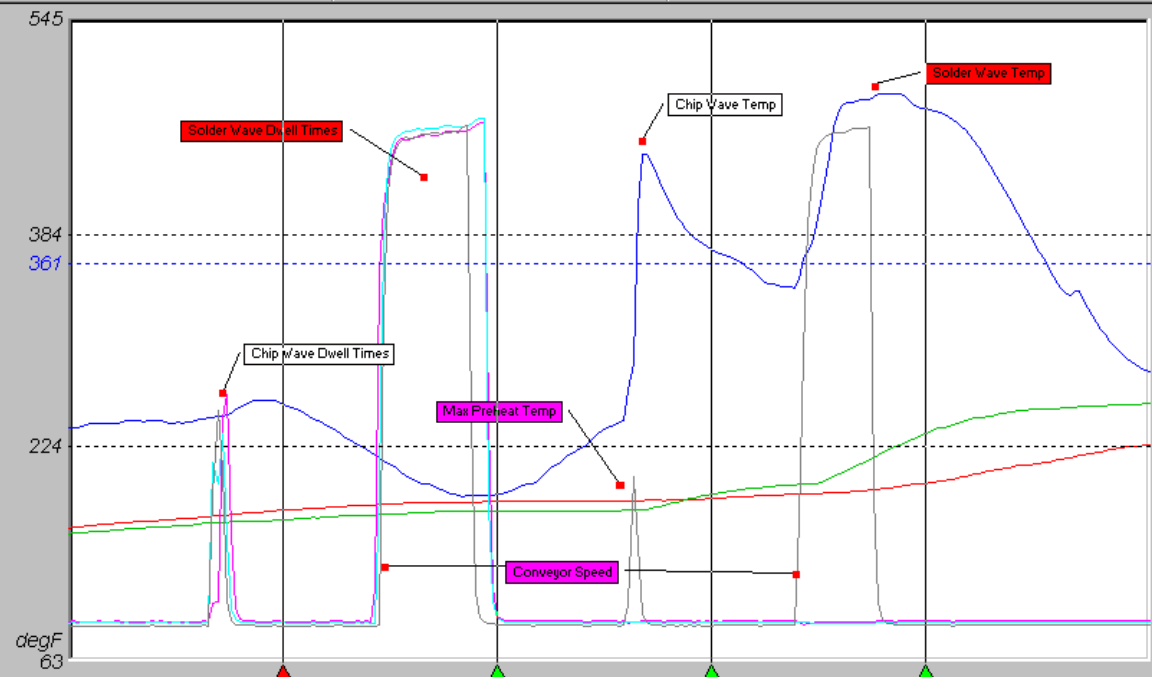
SPC WaveRIDER® SPC V4.03Beta3 - [WRSample.mwr]

File Edit View Format Window WaveRIDER® Profile Tools Navigate Help

WR999999

M.O.L.E.® STATUS
 Max Internal T: 31C
 Battery: 5.040
 Points: 1365
 Active: 123456
 Interval: 00:00:00.1
 Date: 08/08/97
 Time: 13:24:14 V07.41

Tool status box
 Flux



Sensor Locations	C1 = 1019	C2 = 1068	C3 = 1117	C4 = 1166	Units
<input checked="" type="checkbox"/> Coupon Top	177	184	186	197	degF
<input checked="" type="checkbox"/> Coupon Solder	256	189	372	477	degF
<input checked="" type="checkbox"/> Coupon Bottom	170	176	189	234	degF
<input checked="" type="checkbox"/> A	93	98	93	94	degF
<input checked="" type="checkbox"/> B	93	98	93	93	degF
<input checked="" type="checkbox"/> C	90	91	90	91	degF

Value Time To Ref T Above Ref Statistics Summary Stats

Welcome! WaveRIDER® Data Spreadsheet Profile Admin Chip Wave Chip Parallelism Solder Wave Immersion Depth Solder P

X=1199 Y=521F 03/18/01 HH:MM:SS



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Care and Feeding of Your WaveRIDER®

- To Flux or not to Flux your Pallet?
 - Adding flux to the pallet is best
 - At least add Flux to the Contact Sensors
 - Prevent Oxides on contacts
 - Non fluxed contacts will need frequent brushing to remove oxides (black)



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Sharing Data

(C:)

📁 ECD

📁 Wrspc

📁 Sample

***.mwr**

WRxxxxxx.mdm

📁 Customer A

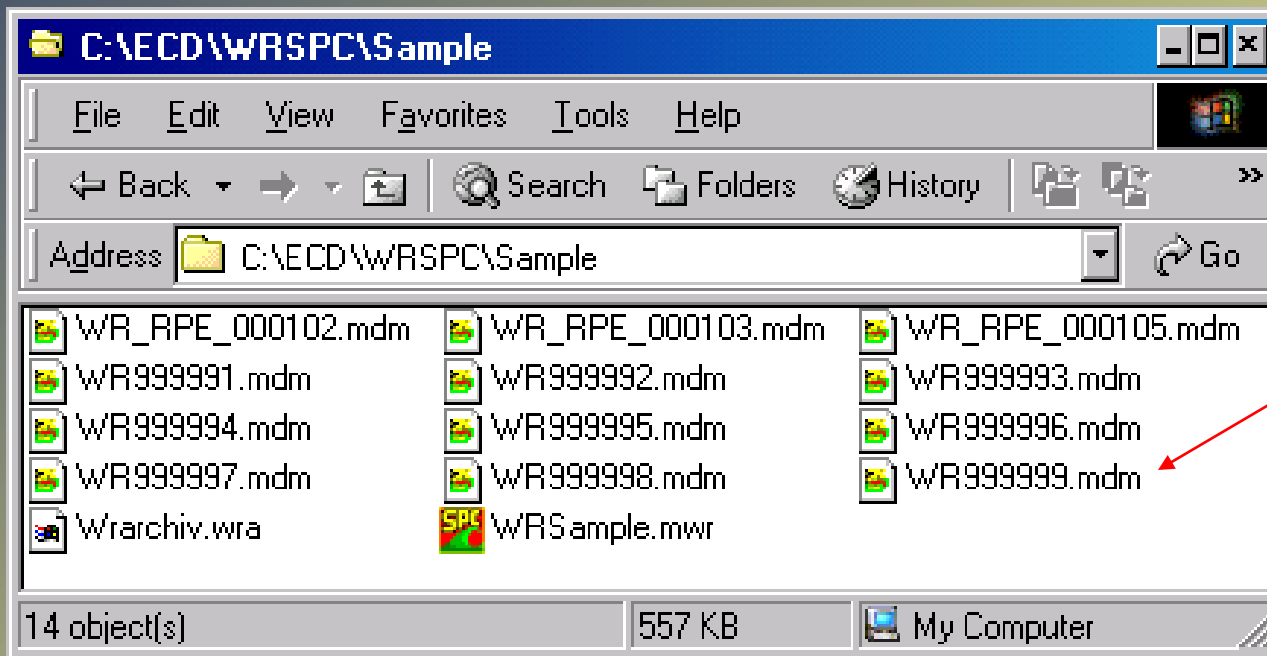
If you move/copy one file to a new directory, you must move/copy all associated files (*.mwr and *.mdm).



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Home of the M.O.L.E.® Profile

MDM's and MWR



BU
General
File Tag
All
WR999999
WR999998
WR999997
WR999996
WR999995
WR999994
WR999993
WR999992
WR999991



WaveRIDER

In Closing

- A Process not measured is not known to be in control
- A Wave solder Machine that's not frequently analyzed will not produce quality product
- You've got a simple to use yet powerful tool in the ECD WaveRIDER®!



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Thank you for attending today's session.

Questions? Contact Training@ECD.com

Visit www.ECD.com/ECDU

ECD Technical Support 503-659-6100