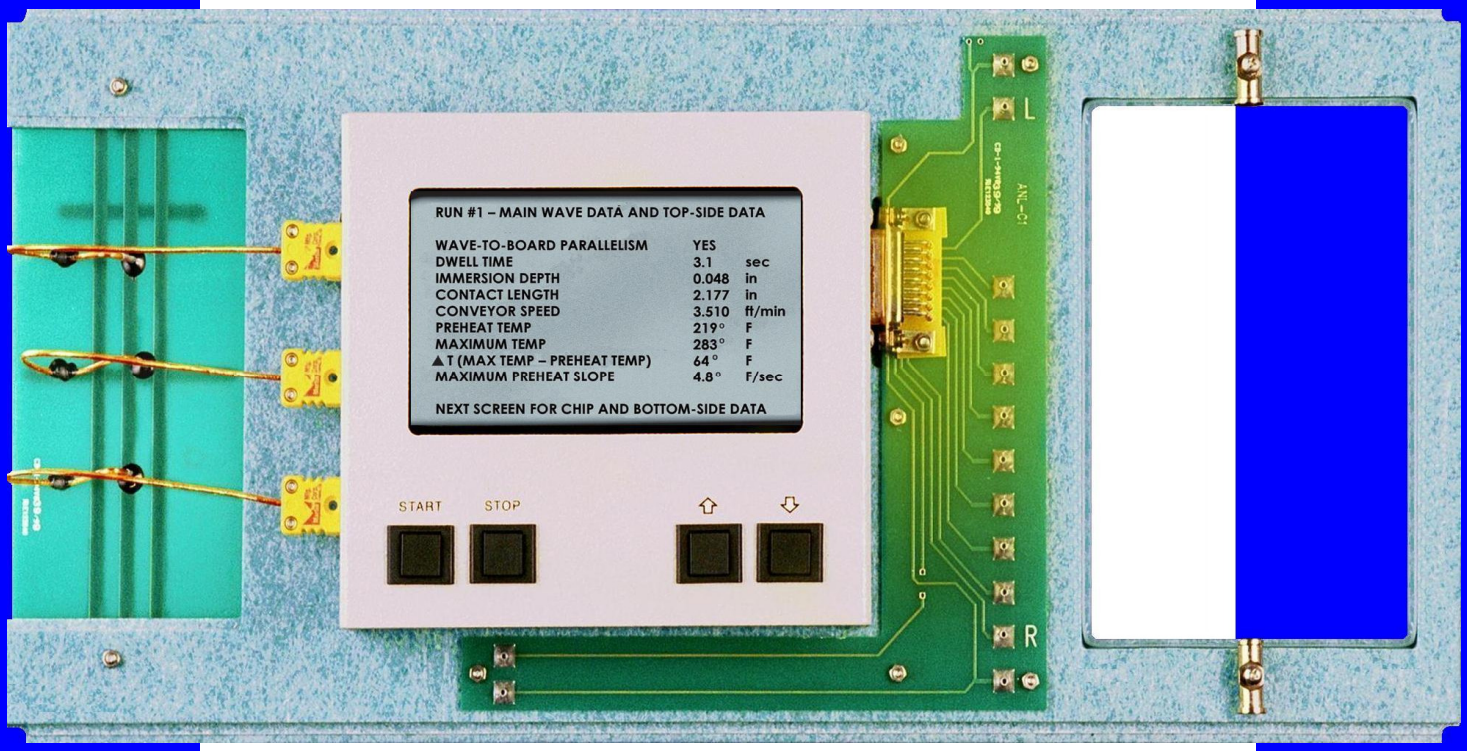
WAVE OPTIMIZER



Reduce Your Production Costs Immediately

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Why the Wave Optimizer?

Fed up with the high costs of wave solder defects? The ones that persist or surprise you despite repeated temperature measurements, chemistry changes and wave machine upgrades? Companies just like yours have turned to a higher impact, more meaningful approach that directly measures the most critical event in wave soldering — ***how your boards travel through your solder wave.***

The WAVE OPTIMIZER is the only device which accurately and comprehensively measures all aspects of your wave solder process in a single run: Board-wave interaction, temperatures and fluxer performance. Because of its unique and powerful capabilities, the WAVE OPTIMIZER is the most widely used, battle-tested, cost-cutting, wave solder process tool in the world.

"Working with the Optimizer made us rethink many of our previous notions on how we should wave solder. We shouldn't blame the board design as often as we have in the past and we now understand that we can't rely on a thermal profiler to control our wave solder process. The Optimizer's LCD display makes it easy for us to respond immediately to the data it provides."
TRW Automotive Electronics

The WAVE OPTIMIZER runs through your wave machine just like your boards, enabling you to do the following:

- ✓ Quickly identify the exact optimal parameters for any PCB assembly,
- ✓ Easily maintain world-class repeatability,
- ✓ Perform informed, on-the-spot adjustments to your wave machine settings.

Thousands of OPTIMIZER users have been producing better PCBs and increasing throughput at much lower cost!

Widespread Use with Proven Results

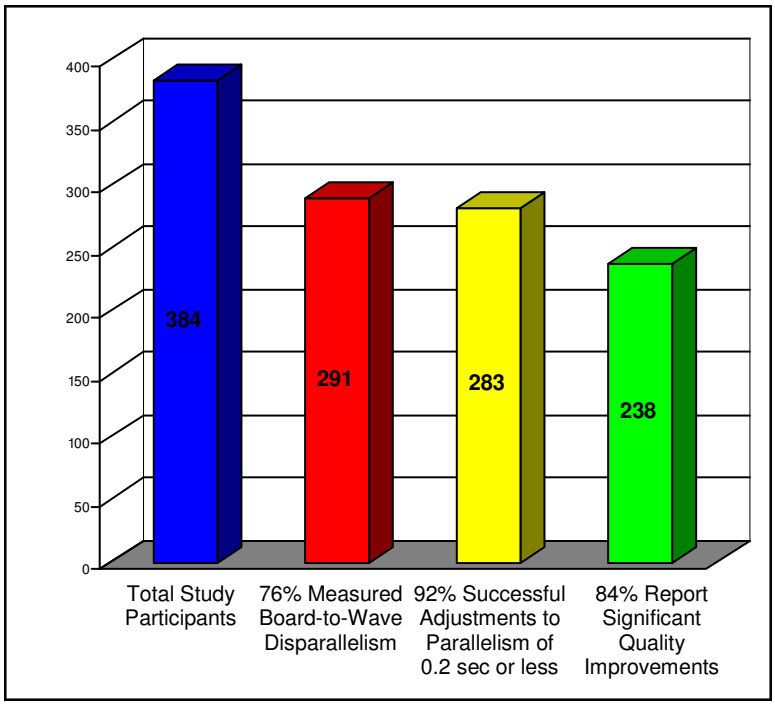
Engineers who are still using conventional wave solder control methods have no accurate way of gauging or controlling their most important parameters. One example of a precise, daily measurement that is vital to good wave solder results is board-to-wave parallelism.

A major study found that that 76% of 384 PCBA facilities who used the OPTIMIZER for the first time did not have their boards properly aligned to ensure parallelism with their solder wave — a condition that leads to skipping, bridging, insufficient solder fill and other defects.

The good news is that 92% were able to quickly make adjustments that achieved parallelism. Most importantly, 84% of these plants reported significant quality improvements right away!

Consider this success story: A facility in Michigan plant uses their WAVE OPTIMIZERS with our easy procedures to establish and verify parallelism daily. On the very first wave machine, boards requiring rework dropped from 13% to 4%, improving first pass throughput from 87% to 96%.

Monthly cost savings are $62,500.00 ***per wave machine*** due to increased throughput alone. Return on investment per WAVE OPTIMIZER was less than four days. The daily parallelism procedures have been implemented on the plant's twelve wave machines. You do the math.



"The Optimizer identified the root cause of chronic skipping defects on our boards. Previous attempts to address this issue resulted in new problems, namely solder shorts. After several Optimizer runs, adjustments were made to eliminate the disparallelism it measured. These modifications had an immediate and positive effect on board quality."
Bose Electronics

Paving the Way to Lower Costs and Fewer Defects

Once parallelism has been established, there are two more simple improvements that will bring you fast, large, measurable cost savings: Controlling immersion depth and optimizing dwell time — independent data points governing your boards' interaction with your solder wave.

Immersion depth must be in your control to achieve repeatable board quality. Direct and accurate measurement of immersion depth is therefore vital.

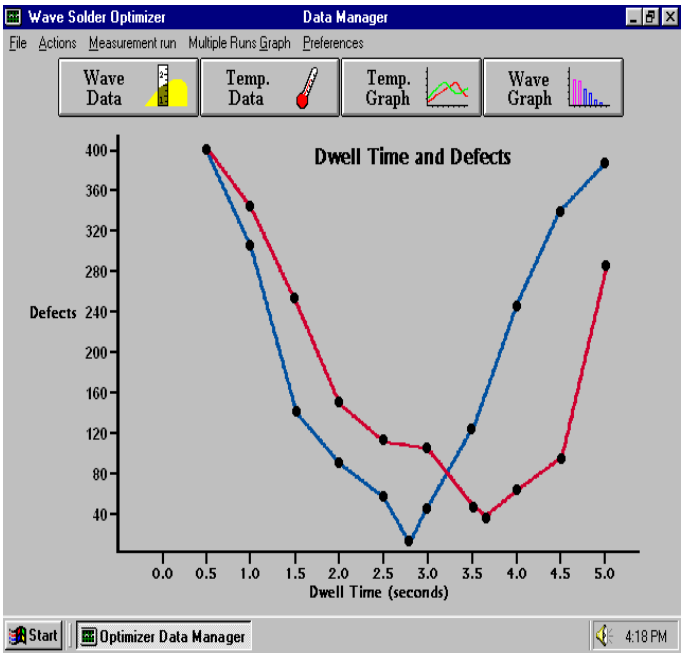
Likewise, dwell time is a critical factor in your board defects. Using optimal dwell times for your various boards is your goal after you've established parallelism and controlled your immersion depth. The dwell time of your leads in your wave is directly determined by four factors: Your immersion depth, your conveyor speed, your conveyor angle, and the exact shape of your wave.

Another success story: After establishing parallelism, a process engineer for plant in Mexico determined optimal dwell times for two board types. Yield loss dropped from 3.00% (330 boards) to 1.60% (176 boards) in the first month of daily adherence to the optimal dwell times. This means a reduction in scrapping of 154 boards per month, or 5.13 boards per day.

Since each of these boards costs the plant $300.00, savings just from improved yield loss total $46,170.00 a month — that's $554,040.00 a year! The OPTIMIZER paid for itself in less than five days.

"We thought we had tried everything possible to eliminate a bridging problem that had been affecting one of our boards. Using the Optimizer, in only a couple of minutes we got rid of the bridging completely by adjusting the dwell time for that board."

Universal Lighting Technologies



"Our problems were recurring insufficients and bridging. We made many attempts to address these problems to no avail. By using the Optimizer software to graph our immersion depth, we identified and corrected turbulence in our main wave. This has been to the long term benefit of our production process."

Clemar Manufacturing

Wave Soldering Myths and Facts

MYTH: Rework and touch-up are part of production.
FACT: Rework and touch-up are necessary only because of production *failures* on your assembly lines. Defects are production failures. Rework and touch-up cost huge sums of money in labor, floor space, rework stations, inspection, hand soldering equipment, consumables, management time and throughput, and increase the risk of field failures. You don't have to live with your current defect rate. Don't accept it.

MYTH: The key to good wave soldering is thermal profiling.
FACT: Thermal profilers give no accurate information on how your boards pass through your solder waves or on your fluxer performance. Without this information your process is fatally uncontrolled.

MYTH: A glass plate provides all the information we need.
FACT: A glass plate gives no precise, repeatable, quantified or retrievable data. Neither does it measure immersion depth. Assessments are subjective, depending on human judgment, eyeballing and reflex.

MYTH: "The old wave machine is the problem" or "The new wave machine controls process."
FACT: Some look to expensive machine upgrades to solve process deficiencies. The fact is that defects do not equal bad equipment and good equipment does not equal good process. ***You*** must control and optimize your process because no machine can.

Vital Capabilities For Quick and Easy Use

Here's a BIG innovation that actually changes the way you do process control: Your OPTIMIZER'S one-of-a-kind, ***four run memory*** LCD display means you will ***instantly view all data*** before and after wave machine adjustments. You can run your Optimizers up to four times and read all data runs BEFORE downloading data to your PC!

This means you will immediately respond to data variations before your board quality suffers. You'll instantly compare data for different board types, for different wave machines, for different runs throughout a shift, and from shift to shift. Your team now has the means to meet your high quality expectations. All at the touch of a button! Get the control at your machine!

What data does your Optimizer provide?

> "The Wave Optimizer, with its Flux Distribution Window, uncovered a problem with our spray fluxer and pinpointed other serious variations in our wave machine."
>
> LaBarge Electronics

BOARD-WAVE DATA
Main Wave & Chip Wave

- ✓ Parallelism
- ✓ Dwell Time
- ✓ Immersion Depth
- ✓ Contact Length
- ✓ Conveyor Speed

TEMPERATURE DATA
Top-Side & Bottom-Side

- ✓ Preheat Temperature
- ✓ Maximum Temperature
- ✓ ΔT (max temp - preheat temp)
- ✓ Maximum Preheat Slope
- ✓ Solder and Ambient Temp

DIRECT WAVE DATA
Patented and Proprietary

- ✓ Your waves are directly measured
- ✓ No unreliable assumptions about your immersion depth
- ✓ No questionable extrapolations from temperatures

FLUXER PERFORMANCE
Distribution & Quantification

- ✓ Verify Thorough Coverage
- ✓ Identify Uneven Distribution
- ✓ Confirm Weight of Flux Applied
- ✓ Measure all aspects of your wave soldering in a single run

Is this approach a fit for you?

Call today to find out if the Wave OPTIMIZER is a potential fit for you.

The WAVE OPTIMIZER'S unique methods, special techniques and daily procedures are not for everybody, but they might quickly save your company money with fewer defects, increased throughput and world class repeatability.

The Worldwide Standard For Lowering Your Wave Solder Costs

MORE TOOLS FOR YOUR SUCCESS

Acclaimed On-Site Training

Our completely unique, high impact training programs will blow you away! Performed at your facility for your entire team. Use the celebrated *Wave Solder Survival Guide* to teach you proven, innovative techniques. We absolutely guaranteed immediate improvements!

Accuspec for Pick-and-Place

Easily and quickly measure the accuracy and repeatability of your chip shooters and flexible placement machines.

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The WAVE SOLDER OPTIMIZER is patent/patent pending worldwide.