



CRITICAL • CLEANLINESS • CONTROL

Electronic assemblies are experiencing more residue related problems today than ever before. Increased circuit sensitivity, closer spacing, greater portability, more rework and repair, and harsher operating environmental conditions are contributing to poorer field performance for products used by all industries. A new process control tool has been developed by Foresite to work on the production floor and in the laboratory for assessing a residue in a specific area (0.1 in²) using nondestructive extraction and testing techniques. This tool is the C3, developed to create an automated, faster, localized extraction and cleanliness test for the production floor. It can be used to assess incoming material cleanliness and monitor assembly and repair processes. The production floor sample extraction from the C3 can be used in conjunction with ion chromatography, FTIR or SEM/EDX for further analysis identifying the type and level of residue that created a conductive event on the test electrode.



The extraction process has been designed to achieve effective ionic residue removal using a heated delivery system consisting of 3 stages:

1. Solution heating/delivery to the extraction site
2. Soak and solubilization time
3. Aspiration of solution to collection cell

This cycle is repeated 9 times to effectively remove the surface residues from the 0.1 in² area, generating approximately 2.0 ml of extraction solution to be used during the testing and afterwards for any desired additional testing.



The system automatically tests the extracted sample in the collection cell by measuring the change in leakage current across an electrode gap caused by the solubilized residues in the extraction solution. A threshold of 500 μ A has been set to identify when a current leakage event has occurred. The electrical measurement is determined by assessing the time it takes for the extraction solution and the 10 volt biased electrode to reach a 500 μ A event. The system works under the theory that the more corrosive or conductive the residue the faster it will achieve this event. The less corrosive or conductive the residue the longer it will take. Since corrosive or conductive residues will create short run times and benign or insulative residues will take longer, electrical test runs that are less than 60 seconds are identified as dirty samples. Sample runs greater than 60 seconds are identified as clean. This threshold has been established from 12 years of research by Foresite using a combination of SIR and ion chromatography data.



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Specifications

Dimensions

28"W x 22"D x 16.25"H (9.5"H with arm assembly removed)
23.25"W x 17"D working surface

Weight

Approximately 70 lbs.

Power Requirements

100-240v AC
50-60 Hz
5.0a @ 120v AC

Included Components

HP iPAQ handheld PC / Model #3835 (or equivalent)
Additional cradle (data download to remote computer)
Seiko Smart Label Printer 100

Disposables

Test cell (single use)
Area tested: 10mm dia. circle / 0.7 sq. cm.
Footprint required: 16mm dia. circle / 2.0 sq. cm.
Bag of extraction solution (1 liter)

Sold & Serviced by:

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Developed & Manufactured by:

Foresite, Inc.
US Patent #5,783,938
UK Patent #2324374B
Germany, China, and Hong Kong patents pending



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C3 Features, Advantages, and Benefits

Feature	Advantage	Benefit
Localized Spot Extraction	<ul style="list-style-type: none">• Indicates cleanliness of a specified location• A 0.1 in² area is tested at one time, and a 2.0 ml sample is taken• The test cell will test the same area size, no matter what the size of the entire subject	<ul style="list-style-type: none">• Customer can select critical areas to be tested• Test results indicate presence of detrimental contaminants in a specified area that is most susceptible to field failure or critical to product performance, durability and/or reliability• Test results do not include contamination in part areas that will not affect product reliability• The presence of a detrimental contaminant will be easier to determine from the test results since the sample will not be diluted by testing the entire subject in a tank• Different sized tanks are not required to realize the most accurate results - with bulk testers reportedly the closer the tank fits the entire subject part, the more reliable the test results• A wide range of part sizes can be tested without equipment modification or adjustment
Production Floor Equipment	<ul style="list-style-type: none">• Immediate, on-site results specifying a 'clean' or 'dirty' test reading• Compact design does not take up excessive space on the production line (28"W x 22"D x 16.25"H)	<ul style="list-style-type: none">• Easily interpreted results allow for quick decisions about the cleanliness of the board and whether or not further analysis is needed.• Device fits easily onto the production bench for analysis when and where it is needed



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C3 Features, Advantages, and Benefits (continued)

Feature	Advantage	Benefit
Disposable Test Cell	<ul style="list-style-type: none"> A new, ionically-clean test cell (including the test electrodes) is used with each test 	<ul style="list-style-type: none"> Test results will not be affected by cross- contamination from previous tests The sample can be sent to a laboratory for further analysis
Manually Positioned Arm	<ul style="list-style-type: none"> User determines specific 0.1 in² area for analysis 	<ul style="list-style-type: none"> Sensitive areas that are critical to performance can be pinpointed for extraction and analysis
Electro-Chemical Migration	<ul style="list-style-type: none"> Indicates corrosive contaminants as well as conductive contaminants Detects poorly-reacted flux residues that cause electrical leakage failures (“cross talk”) Results will qualitatively correlate with that of ion chromatography 	<ul style="list-style-type: none"> Predicts product reliability better since many more detrimental contaminants are sensed Ion chromatography (IC) has been shown to be an accurate forecaster of product reliability
Specially Formulated Deionized Steam is the Extraction Medium	<ul style="list-style-type: none"> Steam has been shown in cleaning processes to more effectively remove residues The solution is 18.2 MΩ de-ionized water - not, for example, an alcohol mixture 	<ul style="list-style-type: none"> The more effective the extraction, the more accurate the test results Improved safety More convenient & safer to ship a test sample to a laboratory for further analysis



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C3 Features, Advantages, and Benefits (continued)

Feature	Advantage	Benefit
Any Waste Water Bypassing the Test Cell is Kept Separate	<ul style="list-style-type: none"> • A check valve assures that contaminated solution (water) is not re-circulated and used in subsequent tests • Test accuracy does not depend on quality of purification system 	<ul style="list-style-type: none"> • Test results will not be affected by cross- contamination from previous tests • Test result reliability is assured
Test is Not Sensitive to Solution or Environment Temperature (temp. is controlled as steam is generated at the test cell)	<ul style="list-style-type: none"> • Test results are not affected by how long the equipment is in use or by room temperature 	<ul style="list-style-type: none"> • Variables affecting test results are eliminated
Integral, Touch Screen Operator Interface with Programmed Test Cycles	<ul style="list-style-type: none"> • Does not require customer-supplied computer • Software is factory-installed • Screen is adjacent to test surface • Customizable settings allow for in-house adjustments • Settings are password protected • Handheld PC dock possesses a locking mechanism 	<ul style="list-style-type: none"> • Cost, space, compatibility • Easier start-up, system-tested • Simplified operator training • Accurate test results are not dependent upon operator skill or experience • Operator convenience • Settings can conform to internal or customer determined cleanliness standards • Prevents unauthorized personnel from changing the test settings • Provides theft prevention



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C3 Features, Advantages, and Benefits (continued)

Feature	Advantage	Benefit
Transferable Data	<ul style="list-style-type: none">• Test results are easily transferred from the C3 to a PC	<ul style="list-style-type: none">• Test results and settings stored in a generic file format are easily cataloged in whatever format (Excel, Word, Notepad, etc.) the customer would like for future reference
Label Printer	<ul style="list-style-type: none">• Attached label printer supplies automatic read outs to attach to the applicable sample	<ul style="list-style-type: none">• Preparing samples for shipping and cataloging is streamlined by having relevant data printed on adhesive labels
Storage Drawer	<ul style="list-style-type: none">• Necessary testing supplies are readily at hand in the storage drawer	<ul style="list-style-type: none">• Testing supplies are conveniently located, and protected from contamination that could occur on the production floor
24-Hour Customer Support	<ul style="list-style-type: none">• Engineers are prepared to answer application and troubleshooting questions whenever they arise	<ul style="list-style-type: none">• Customers are assured that any questions will be handled immediately and attentively by product experts