Custom Interconnect Limited

The Specialists in
Services and Solutions…

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A Total Solutions Provider

Custom Interconnect Limited has a proven track record in the manufacture of electronics Printed Circuit Board Assemblies (PCBA) and the provision of complete Product Build, ready tested and delivered to their customers, or indeed the end user.

We provide a single source capability from the procurement of all required materials, and complete electronics production including: -

- Bare Die Bonding, Wire Bonding and micro-packaging of Electronics
- Surface Mount Assembly (SMT)
- Conventional Assembly and Specialised Soldering
- Product testing, including X-Ray, CSAM, 3D AOI and Flying Probe Testing
- Product assembly & testing, a complete box build service
- From Prototype quantities, requiring our unique "Rapid" service to full production volumes using the benefits of our Global Sourcing of Materials and our established production methodology, rapid@cil-uk.co.uk

Our History

Custom Interconnect Ltd was formed in 1987 and has grown steadily to become one of the major Electronics Manufacturing Service companies available today. Located in Andover, Hampshire, in the United Kingdom our 3 manufacturing facilities comprises 80,000 sq ft of modern production space.

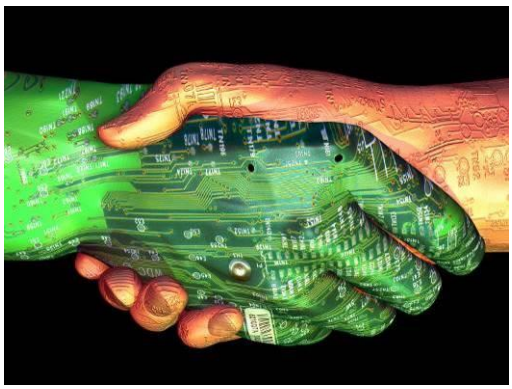
Environmentally Controlled with Full Anti-Static Flooring at all sites CIL can provide you with one of the premier manufacturing facilities available in the UK. Our fully integrated Business Control system gives us the visibility and planning tools required to ensure that we have sufficient materials and resource available to meet your manufacturing needs.

Having developed a number of Industry Sector teams, we can provide cross functional teams which understand the needs of our customers, both existing and new; these specific skills extend into the production teams where people understand customers needs and desires, a unique but highly important perspective on the "Customer".

Our Customer Markets

Supporting Customers across the United Kingdom, and within mainland Europe, extending into the Americas and Australasia, CIL also operates across very diverse markets, a few primary ones are detailed below: -

- Down Hole Oil and Gas
- Automotive PHEV & BEV Power modules and control electronics
- Homeland Security, Border Control and Counter Terrorism
- Military, Naval Systems and Avionics
- Marine Rescue, Location and Distress Beacons
- Medical Devices and Sensors "Lab on a chip"
- Transport Infrastructure, ANPR, Security and Safety Systems
- Professional Broadcast, Audio & Video equipment
- High Powered LED, visible & non-visible sources
- Nuclear and Petrochemicals



Custom Interconnect Limited engages with clients from product conception to mature production and post delivery support services. It is accepted by CIL these partnerships require understanding and commitment and adaptability, flexibility and responsiveness is key to partner success. CIL's team has an established level of expertise and the all-important willingness to continue to continue to learn with our clients.

Quality Assurance Arrangements. Environmental and Health & Safety.

ISO9001:2015 remains the backbone of our Business Control System and we also are ISO13485:2016 approved for the manufacture of Medical Devices. In addition to ISO9001:2015 & ISO13485:2016, we also hold AS9100 Rev D quality approval for Aerospace and Aviation products.

In addition to our quality accreditations, CIL also holds Cyber Essentials certification. Cyber Essentials helps is to guard against the most common cyber threats and demonstrate CIL's commitment to cyber security on its IT systems.

Our guidance for all Controls relating to the preservation of the Environment is taken from the ISO 14001 standard, and we have published Policies and Codes of Practice in support of these internationally recognised standards.

Our Quality Assurance Team understand the requirements needed to support the traceability and associated production records required for devices which are mission or in-service critical, and construct appropriate History or Record systems required for all projects.

The achievement of required Product Quality Standards is a given at CIL and we continue to strive to exceed and improve, a trait which has held us in good regard within the High reliability market sectors. IPC standards are adopted as the specific standard and codes of practice issued or referenced by our customers.

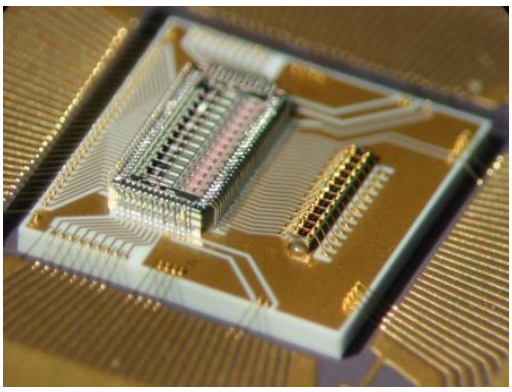
Advanced Manufacturing, (Micro-Electronics).

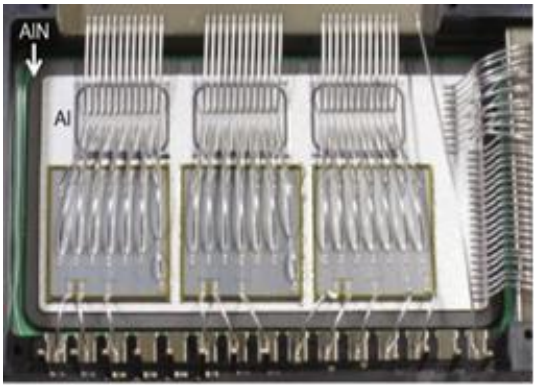
Custom Interconnect Limited is the Largest Independent "Chip & Wire" facility within the United Kingdom, and has an established reputation for providing outstanding Engineering Solutions to Technical Problems. This being one of our foundation skills we have accumulated extensive knowledge and expertise in the following key disciplines: -

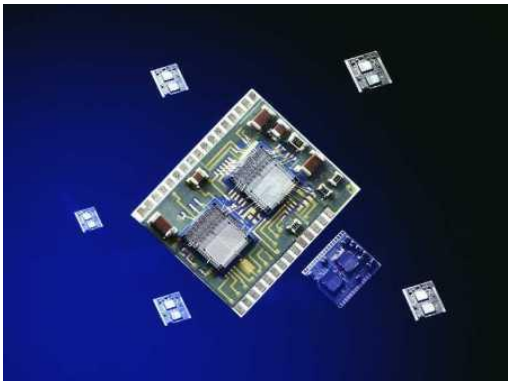
- Automotive PHEV & BEV Power modules
- Silicon Carbide (SiC) and Gallium Nitride (GaN) packaging
- Custom BGA's, (Ball Grid Arrays)
- Placement and bonding of complex optical devices, sensors and arrays
- Multi Chip Modules & Chip Scale Packages
- Chip on Board, Chip on Flexible Circuits & "Lab on a Chip" solutions
- Re-Packaging of Silicon Die within bespoke solutions.

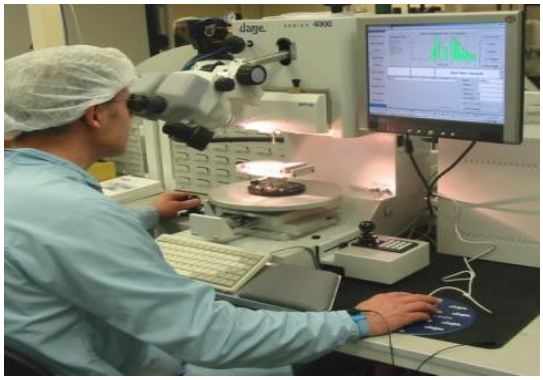
And combinations thereof…

Work of this nature is conducted within a dedicated "Clean" and environmentally controlled area; the following manufacturing disciplines are managed by CIL Engineering.



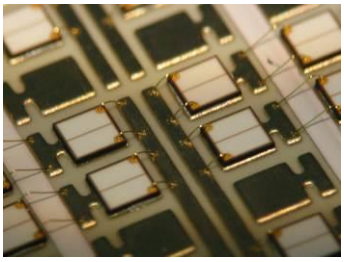






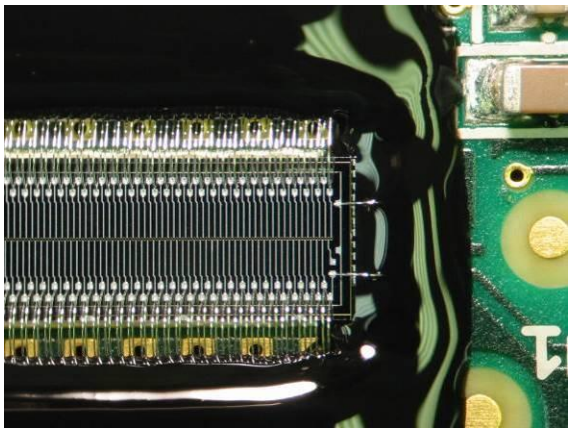
Die Bonding

CIL Advanced Manufacturing provides the attachment of bare die using conductive and non-conductive die attach materials, this includes epoxies, eutectic solders and pressureless/pressure Silver Sintering. We process production volumes of several 100,000 die per month down to single projects for "Proof of Concept" or prototypes. Our placement capability in terms of positional accuracy is less than 10 um X & Y and theta accuracy of <1.0 degree. Experience and running production quantities of SiC / GaN / ASIC's / MEM's / LED's / Detectors / Sensors / Lab on a Chip and all commercially available die types. The smallest die we currently process is 200um x 200um, and the largest is 175mm x 150mm.



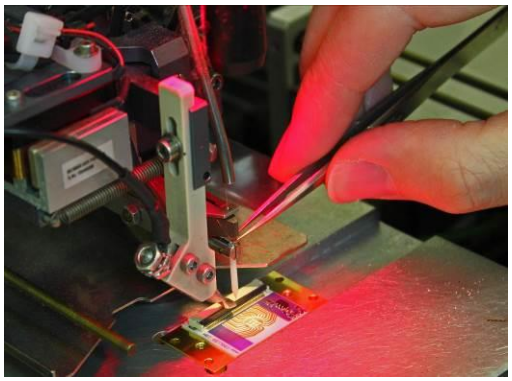
We are able to bond die to a variety of substrates, and as new or revised materials and structures become available, we are able to conduct shear testing in-house and ensure that appropriate standards for die attach are met.

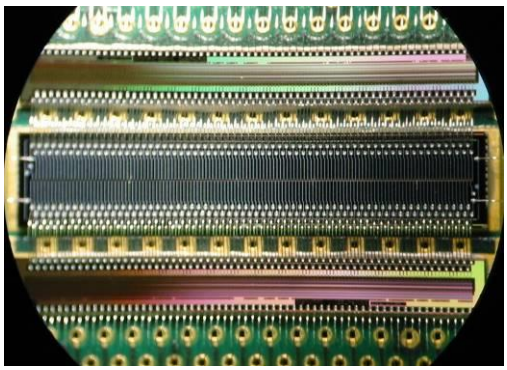
- FR4 Laminates, including flex-rigid
- Alumina or other Metallised ceramics
- Direct bonded copper (DBC) Substrates
- Active Metal Brazing SiN (AMB) Substrates
- Thick Film & Thin Film
- Polyimide rigid and flexible
- Commercially off the shelf (COTS) packages

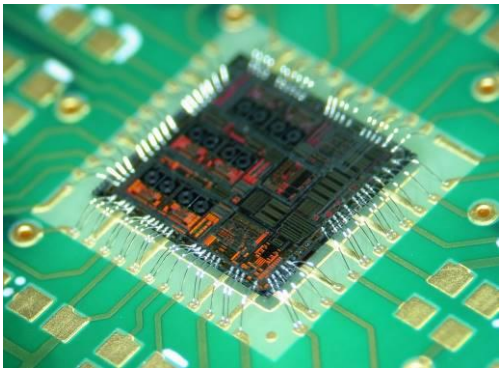


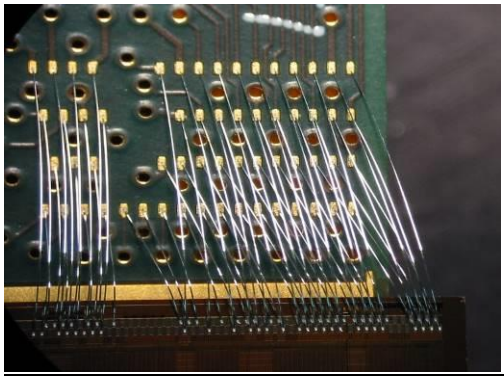
Wire Bonding

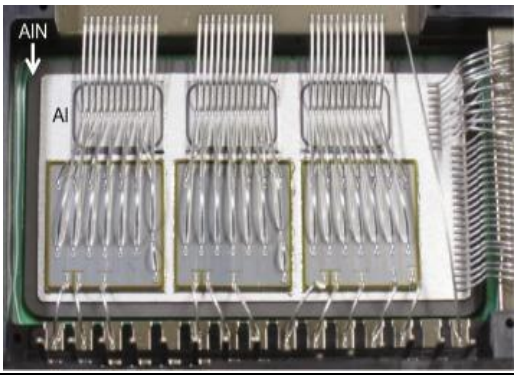
Fully complimenting CIL's Die Bonding capability is its fully automated Wire Bonding, where we can use both Aluminium and Gold Wire Bonding, utilising "Wedge" and "Ball-Bonding" formats. In addition to fine wire, we also have Automatic Heavy gauge Aluminium/Copper wire/ribbon wedge bonding. Couple this with our Automated Die Placement and we can provide an automated volume-based solution. Our processes require strict control and we can achieve this using our QA Wire Pull testing station and can accommodate a number of wire diameters. Following die placement and wire bonding we can also provide an encapsulation, or glob-topping service subsequent to complete device testing.











Advanced Manufacturing Support Facilities

CIL's expertise and experience is available for our customers and we are well placed to assist and advise on methods, process selection and the materials available. We can fully support projects and are able to combine our own expertise with that of our other Industry partners and suppliers, so that best economic and quality levels are always attained. Our in-house resources such as Digital X-Ray/CT scan and non-Contact 3D measurement, Flying Probe Testing, Scanning Acoustic Microscopy (CSAM) and Temperature Cycling are also available as project control tools.

Surface Mount Assembly & Verification

General

Custom Interconnect Limited has within its Electronics Manufacturing Facility 5 fully independent Surface Mount Assembly Lines all 01005 capable, comprising in-line Automated Solder Paste print, High Speed Placement of Surface Mount Devices and Multi-Zone Re-Flow including N2 atmosphere.

In addition to the very latest in solder print technology the Mydata MY500 Solder Jet Printer, all of our Solder Paste Screen Printers operate with an integral Paste verification system prior to placement. Manufacturing Capability for component placement through our Surface Mount Assembly is from 01005 Chip components to larger 55mm square devices and all current IC package styles. Reflow Soldering can be achieved using our multi-zone reflow systems and can be soldered in a Nitrogen Environment using high reliability solder pastes. For power devices used mainly in the Automotive BEV & PHEV systems we have Vacuum Assisted Vapour Phase reflow for very low solder voiding and in line vacuum soldering for volume production.

Batch sizes we can accommodate are from low quantity early models to the higher production volumes, and everything in between. Complexity extends from the very simple to high complexity double sided multi-layer assemblies utilising a variety of substrates, including the high temperature Polyimide and specialised RF base materials

Solder Paste

Solder Paste Screen Printers are DEK Horizon 03iX all with Hawkeye 100% solder print inspection verification. These are complimented with a Mydata MY500 Jet Printer which provides CIL with the versatility we need for early model production and the ability to process and apply paste into PCB cavities and for applications such as stacked components.

Placement Stations

CIL is equipped with 5 modern SMT placement lines, all with in line solder printers. All 5 SMT lines are equipped with new MICRONIC MY300 SMT placement machines which are 01005/CSP capable. These 5 SMT lines give CIL significant SMT capacity, but more importantly it gives CIL an overwhelming flexibility within our manufacturing resource. In terms of our technical capability, we are currently placing 01005 chip components every day of the week. In terms of IC's packages, BGA's, LGA's, QFN's etc are the norm and we are placing modern packages such as CSP and uCSP again on a daily basis.

Reflow-Soldering

CIL operates within the High Reliability and High Temperature market sectors and accordingly process many High temperature Laminates and substrates;

therefore, we possess high capability multi-zone reflow soldering machines. All Projects are assessed as part of our NPI, (New Product Introduction) processes and re-flow profiles established based upon the thermal characteristics of the layout and the components used, this becomes an established critical process parameter. Re-Flow Soldering can also be achieved in a Nitrogen environment ensuring that no oxidation of substrates or solder surfaces can occur during the reflow soldering process. In addition to 10 zone air/N2 Reflow we also have ASSCON VP6000 Vacuum Assisted Vapour phase used predominantly in the Automotive BEV applications where <5% solder voiding is required. This system is for small to medium batch sizes

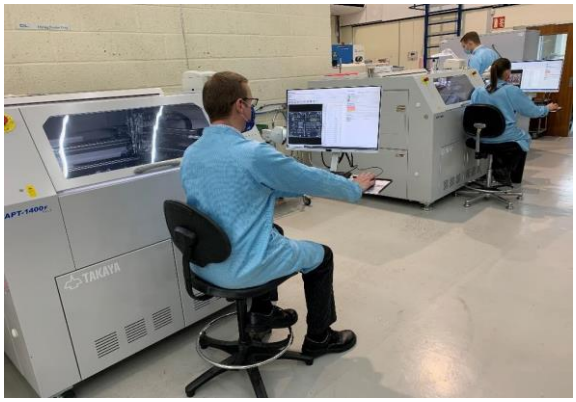
In addition to the ASSCON VP6000 system, in September 2022, CIL also installed an in-line 10 zone N2 reflow oven with vacuum assist. So CIL now has the VP6000 solution for small to medium volume production and the new in-line vacuum system for volume production of power electronics where solder voiding of >5% is not acceptable

Surface Mount Assembly Support Facilities

Our Engineering and Customer Support Group possess an extensive experience in the processing of PCB's containing a wide variety of components and are available to assist and advise on all new projects. Process Verification is achieved using our in-house X-Ray/CT scan, Koh Young 3D Automated Optical Inspection (AOI), Flying Probe Testing (FPT) and Scanning Acoustic Microscopy (CSAM) and the base industry IPC 610 class 2 & 3 standards as levels of acceptability. The 3D AOI systems come complete with extensive "live" SPC data collection and control.

Our Bake-out and in-process storage facilities are paramount to achieving high reliability electronics and where specified components and sub-assemblies are pre-baked or conditioned prior to controlled storage within Nitrogen charged & Temperature controlled cabinets.

Choices are available for Solder types, such as "Clean" or "No-Clean" and Un-Leaded or HMP type solders including Leaded, and SAC305 solders.



Conventional Electronics Assembly

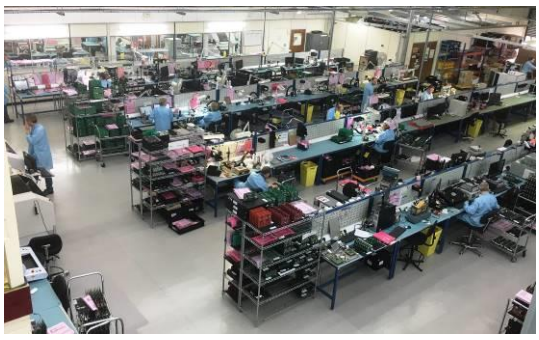
General

The market tendency and increase in the variety of Surface mounted solutions is for the reduction in Conventional Assembly of electronics, inevitably it continues with many wound and power devices and interconnect. Within CIL's markets of Oil & Gas, Defence & Homeland Security we continue to provide a great deal of Conventional Electronics manufacture.

We use a combination of single work stations, flow-lines and light-guided assembly stations, operating to standards of workmanship; IPC 610 levels 2 & 3 target conditions.

CIL is able to provide specialised soldering of high temperature components and substrates, where soldered surfaces are prepared and pre-conditioned prior to the soldering process, backed up with XRF testing and X-Ray inspection of joints and surfaces. Down-hole Oil & Gas drill bit PCBA's operate at 150°C, 165°C, 185°C and 220°C for up to 4 years whilst pulling 20 G's

Our Automated Soldering includes both Leaded and Lead-free wave soldering and Lead-free Selective soldering equipment. Hand soldering to internationally recognised standards as well as CIL Employees holding National Awards for hand Soldering.



PCBA Cleaning, Conformal Coating & Potting

PCBA Cleaning

Custom Interconnect has a process matched cleaning system based upon the MB TECH NC25 System and Zestron Chemistry. An extensive trial and approval process, including agreement with our customers ensured this system matches all expectations and matches our additional processes, such as Conformal Coating and Potting.
CIL also uses a contaminometer which uses both IPC and DEF STD levels of cleanliness as benchmarks.

Conformal Coating

Following a specified board cleaning regime, we can provide a Conformal Coating service using either a controlled dip and withdraw system, or a spray system, boards or assemblies can be masked to prevent coating ingress.

Potting or Component Staking

Within the High Reliability sectors some components or assemblies require complete or partial encapsulation, using a variety of materials and application or staking methods, Custom Interconnect has a wealth of experience in the selection and application of such materials.

Testing and Inspection

General

At CIL Quality Standards or Workmanship standards, Materials we source and the Processes chosen are verified against known or established Standards. We develop, with the customer, a test and Inspection plan as part of our NPI Process from the inspection or testing of incoming materials to the in-process controls required for ongoing production, and tests to be adopted for final product release.

Our Quality Assurance Team and Test Engineering Support group will work with our clients to ensure that we only supply 100% inspected and fully tested product, that operate to planned and expected levels of operation, safety and reliability.

Goods Inwards Acceptance

Materials and Components can be verified at Goods Receipt ensuring that critical parameters have been met by the supplier, Inspection schedules are created and administered by CIL Quality Assurance and observes inspection and testing history and experience, the results of which also feeds the Supplier Monitoring system of supplier "Quality" attributes.

In-Process Inspection

In-Process Inspection of Electronics Assemblies produced at CIL uses a series and combinations of "First Off" machine or process verifications Batch Inspections and 3D Automated Optical Inspection. CIL uses Koh Young Zenith2 3D Inspection Stations and due to the precise and quantifiable measurement of the Koh Young platform and by exploiting KSMART Statistical Process Capability, our Engineering Process Improvement & Quality Teams can aggregate real time production information to not only remove the chances of an escape, but also to study our production processes in detail to improve our yields and drive our quality standards ever higher. This functionality comes alongside many new features of KSMART including Remote Line Monitoring, Offline Programming, Offline fine tuning and Foreign Object Material Inspection. Using the machine capability and KSMART software packages, CIL assists all customers with statistical data on their products for design for test (DST) and design for manufacture (DFM) on early prototypes / pre-production. This statistical feedback enables customers to fine tune their designs to guarantee long term reliability of their products, which of course will be confirmed by all production, both SMT and Thru hole components and soldering being 100% 3D inspected.

In Process Testing including Flying Probe Test

In conjunction with Inspection processes, we recommend a level of testing which verifies the assembly of components fitted their respective values and operational characteristics. Using predictive software tools, we are able to provide customers with an expected "Test Coverage" for Flying Probe Fixtureless testing a quick and easy method of presenting electronics assemblies for functional testing to a very high confidence level. CIL has two of the very latest TAKAYA APT1400F Flying Probe Test Stations, all providing a very reliable and repeatable In Circuit Test of components.

Scanning Acoustic Microscopy (CSAM)

When processing high power heavy copper electronics as used on Automotive PHEV and BEV power modules and control electronics in many instances X-Ray / CT scan is rendered unusable due to metal thicknesses. To compliment CIL's in house X-Ray / CT scan it also has in house SONOSCAN GEN7 Scanning Acoustic Microscopy (CSAM)

High Precision / High-definition Digital Optical Microscope

To compliment 3D AOI, FPT, X-Ray, CT scan and CSAM also has in-house 4K Ultra high definition 4K Digital Optical Microscope complete with 1um laser measurement system.

Functional Testing

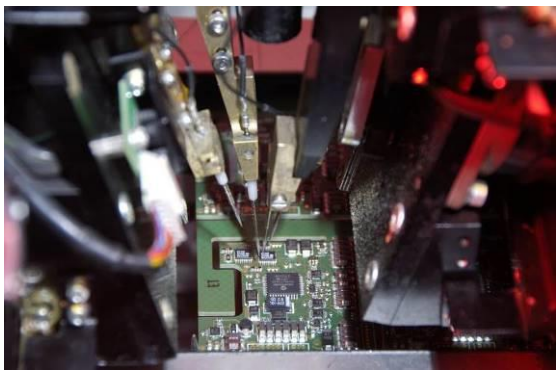
CIL has established itself as one of the leading providers of testing solutions available with high capability in the High Temperature Electronics, Communications and RF sectors. In addition to this high skill set we have an array of available equipment and platforms such as JTAG and Labview, in addition to custom made testing jigs and fixtures, and proprietary equipment.

We can offer Test screening such as Temperature Cycling, Humidity and RF Shielding and Screening. Some testing we conduct is in unique environments such as Non-Magnetic and Open Channel and Frequency testing.

Primary Test Equipment

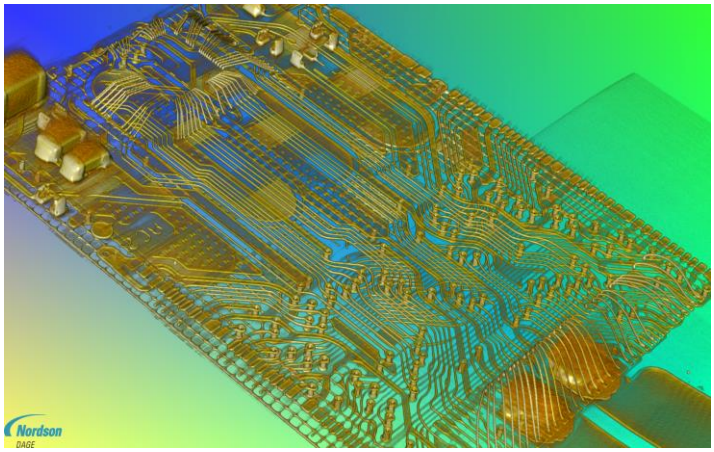
Listed below are a selection of the Primary Test Stations and Equipment we have available at CIL: -

- 2 off Koh Young Zenith2 3D Automatic Optical Inspection (AOI) stations
- 2 off Takaya APT1400F Flying Probe Test Stations
- DAGE QUADRA 5 digital X-Ray inspection & CT Scan capability
- SONOSCAN GEN7 Scanning Acoustic Microscope (CSAM)
- KEYENCE VHX-7000 4K Digital Microscope with 1um laser measurement
- Various Signal & Function Generators
- Spectrum Analysers
- Labview Stations with IEEE interfacing
- JTag Boundary Scan
- Temperature Cycling with Humidity, 15 degrees per/min
- Various Meters, Power Supplies and obligatory test equipment.
- Screened Room
- Soak Testing



Flying probe test

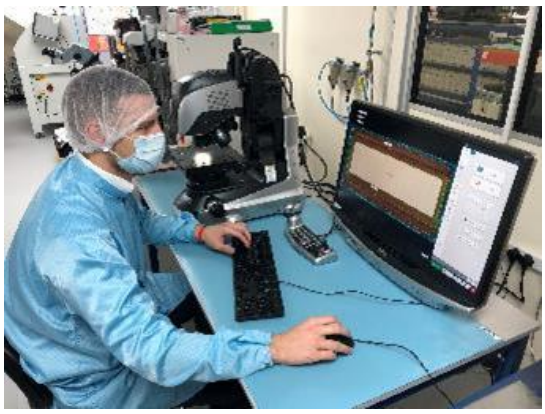
Takaya x 2



Full X-Ray and CT Scan

X-Ray

GEN 7 Scanning Acoustic Microscope (CSAM)

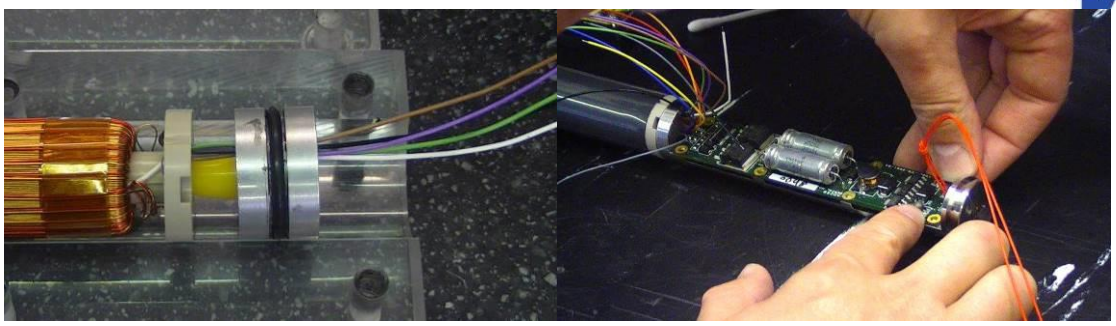


KEYENCE VHX-7000
4K Ultra high-Def Digital Microscope

Product Box Build & Testing

General

Custom Interconnect has established a Product Build Facility in full support of our Electronics Production resource. Comprising a stand alone environmentally controlled facility equipped with its own clean-room for the assembly of optical and electro-optical devices and sensors. Equipped with a Goods Acceptance and Finished Goods Storage, and providing the essential services required for the manufacture and testing of Electronics Assemblies.



Our Product Build facility is producing Test Equipment for the Nuclear Industry, Medical Devices to ISO13485:2016 and Down Hole Oil & Gas Probes & Gauges.

CIL can also accommodate "Back to Base" repair and Product upgrades for customers including specified levels of refurbishment.

Rapid Prototyping

General

A specialised manufacturing service provided for Engineers by Engineers. Customers are encouraged to communicate directly to Custom Interconnect Engineering group regarding the Manufacturing of early models and prototypes. Their time scales, and the technical requirements of Materials and Processes required.

Using a Fast-track quoting and estimating system prices and commercial options can be supplied quickly to enable any materials procurement to proceed at pace ensuring that production turn around may be optimised.

Production may utilise Hand Placement or Machine Build or if appropriate a combination thereof, whilst ensuring that project and engineering tasks and objectives are met. Additional quantities, "Beta" or secondary production runs can then be planned in with Full NPI Controls but taking account of the early production experiences and learning, an ideal scenario for both parties.

In addition to our RAPID service, we have also recently installed 3 off SolidWorks CAD stations and three mid-level 3D printers. Due to the increase in demand for our box build service, mechanical aspects are increasingly becoming more important to our customers. Therefore, we can now better assist with both electronic and mechanical aspects. Furthermore, using our in-house 3D printing and external access to much larger machines assist customers with right first-time designs and time to market.

APC15@FutureBEV

Accelerated Technologies for Future Battery Electric Vehicles (@FutureBEV) will ensure competitive powertrains in function and costs and enable UK technology transformation to zero emission mobility. Two premium automotive global companies, BMW & McLaren Applied join forces to bring together a development team to include Custom Interconnect Ltd (CIL), Lyra Electronics from industry and Compound Semiconductor Applications Catapult (CSAC) and University of Warwick (UoW). Together the team will develop a new UK supply chain for sub-components and system capability for future electromobility addressing UK Government targets for industrial growth, generation and safeguarding of jobs, and the transformation to zero emission mobility. The technology drives BEV from niche to mainstream.

Custom Interconnect Ltd (CIL) expands with a new Semiconductor packaging and power device / PCBA manufacturing facility.

In September 2022 CIL announced that it is creating an advanced semiconductor packaging and power device / PCBA manufacturing facility in the UK. The 46,000sq ft is in addition to its existing 34,000sq ft, giving CIL over 80,000sq ft in Andover, UK. Following a stage 1, six month fit out of ISO7 (Class 10,000) cleanrooms, totalling 15,000sq ft, and associated offices, all of CIL's micro-electronics and power device development will relocate to the new facility in March 2023.

CIL has seen very strong demand for its micro-electronics and electronic assembly capability, especially through the COVID period and when coupled with its InnovateUK funded power device development programs, it has generated the demand for this increased capacity and capability. Starting with InnovateUK funded project GaNSiC and then followed by APC15@FutureBEV, CIL has been developing GaN and SiC based power modules, discrete devices and associated Power PCBA. These two projects have subsequently been added to under various APC / DER / DCMS / InnovateUK initiatives in multiple market sectors, all focussed on more efficient power electronics. The solutions are not limited to the Automotive sector, as CIL finds itself working on other sectors such as Rail, Aerospace, 5G Comms and Web based infrastructure. Starting a little over 2 years ago, CIL has increased its Engineering department from 8 persons to the 30 persons it is today with more recruitment planned. This engineering increase coupled with the additional capacity and capability will create one of the UK's largest semiconductor packaging facilities and will accommodate both development and full volume production.

In addition to the extra capacity, CIL is also adding additional capability as it adds a DISCO DAD 3361 dicing saw, Boschman UNISTAR Automatic Film Assisted Plastic Overmold and Scheugenpflug VDS U1000 / LP804 VDU Auto epoxy fill system. Once commissioned, this equipment will enable CIL to offer UK based wafer dicing and full device overmold such as QFN's, partial device overmold and power module potting to be manufactured in a UK based, UK owned facility.

In March 2023 the stage 1 fit out will be complete and CIL will then relocate its micro-electronic production and power module / device development to this facility.

Contact details are as follows: -

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Phone UK 01264 321321

Please contact Rapid Team at rapid@cil-uk.co.uk