

#### **Electronic Manufacturing Solutions**

#### **CUSTOMER INFORMATION PACK**

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# **Overview**

At QuickCircuit we provide full turn-key electronics manufacturing service for our local and international partners.

Our manufacturing facilities across Auckland and Christchurch undertake procurement, PCA and box-build services, warehousing, distribution and technical support as part of our manufacturing as a service (MAAS) framework; all of which is underpinned by an aerospace level quality management system where QuickCircuit is New Zealand's only AS9100 Aerospace Certified electronics manufacturer.

### Introduction

In operation since 1999 QuickCircuit then has cemented itself as a leader in electronic manufacturing through robust quality systems, combined with the best staff, and the latest in manufacturing equipment.

Over the years, QC has worked along-side and provided services to New Zealand's leading technology firms, from consumer products, household automation systems through to medical devices, in-flight entertainment (IFE) and product for international Aerospace organisations.

Employing staff across multiple sites including Auckland & Christchurch, as well as a sister company in Shenzhen, China we have the people to deliver full turn-key customized solutions from prototype to high volume manufacturing and everywhere in between.

Our procurement teams have extensive industry knowledge, that when combined with in-house written MRP software enables rapid response to both the smallest and largest of changes while ensuring full traceability to aerospace quality requirements.

The local New Zealand manufacturing sites are specialized at quick turn manufacturing allowing for just in time manufacturing, while our distribution systems allow our customers to keep stock on hand of both raw parts and completed assemblies at QuickCircuit to achieve significantly reduced lead times to the end customer without burdening them with the storage of stock and finance concerns.

Being flexible in our manufacturing lines and final assembly means we can take on small and/or large jobs and different configurations of product runs to meet the demands of our customers.

Maintaining our agility is part of our success with the in-house software team supporting the ever-changing requirements of every product and customer. We can customize solutions that meet the requirements of your organisation from simple reports through to robust process requirements and end of manufacturing data packs.

QuickCircuit's Quality Management System (QMS) is certified to AS9100, the aviation, military and space standard which encompasses all ISO9001 as well as specialized clauses for the aerospace industry. AS9100 is one of the most robust quality standards in the world, and one that we believe makes QuickCircuit the essential choice for those complex assemblies where robust processes and traceability are key to market requirements. QuickCircuit is committed to reducing its environmental impact, and as an environmentally conscious organisation we are certified to ISO14001 to ensure we take the environmental impacts of our work into consideration at every level.

The best staff need the best training and that is why we standardize on IPC-A-610 which is the industry standard for the Inspection of Electronic Assemblies. We have an in-house IPC-610 qualified trainer who undertakes training of staff to ensure our *quality comes first* philosophy is always upheld.

A secure web-portal gives customers access to our system and provides a transparent and open view of data and progression of orders while allowing for ECN management, in-production track and trace capabilities and stock control.

If you'd like to know more about how we can support your business, please talk to us or come and check us out by arranging a factory tour.

#### Combine great people, high-end equipment and production systems to deliver the best solutions for electronic assemblies



# **Customer Support Team**

Communication and access to support personnel is paramount. We have dedicated account managers who can help you through your entire journey with us. They can provide information on your product at any time and are always keen for a factory tour. Communicating good information enables the process from initial quoting to delivery of product to be quicker and more streamlined.

Our support team can provide further assistance for specific purchasing requirements, quality system, and finance.

#### **Key Contacts**

Management Warren Yee – Christchurch Managing Director +64 3 662 9888 x318 warren@quickcircuit.co.nz

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#### Christchurch

Laura Holden Account Manager +64 3 662 9888 x326 Laurah@quickcircuit.co.nz



# Capabilities

QuickCircuit can meet the demands of our small and large customers through our flexibility to make changes easily all while ensuring we uphold the most stringent of quality systems and traceability.

With hundreds of active customers our production line is constantly adapting to different products and customer needs.

Our Surface Mount Technology lines are running Automated Optical Inspection equipment to ensure high quality boards every time. Our internal systems, algorithms and processes are always looking for continuous improvement to ensure we deliver the best quality solution for you and your customers.

Our final assembly teams build product ready for delivery to end customers. We can tailor production needs and your product for each end customer, whether it is configurable programming, switches, cabling requirements or external casing or different labelling requirements.

We invest heavily in latest generation machines allowing increased throughput as well as micro placement down to 01005 chips, with 0201 chips pick and placed regularly. Other equipment beyond SMT, AOI and selective soldering includes, nitrogen generation and robotic dispensing and spraying for conformal coating and gluing applications

A huge point of difference is our in-house software team dedicated to constantly tweaking and evolving our tailormade ERP systems including; production floor, unit tracking and stock control traceability systems to meet aerospace standards.

- Aerospace Quality Management System
- Prototype to Full turn-key manufacturing solutions
- Kanban assembly management
- Direct to end customer requirements
- Automated Optical Inspection
- Traceability to aerospace industry requirements
- Programming and test services
- Hand assembly, wave solder, selective soldering, BGA rework station, environmental chamber
- All levels of compliance
- Statistical Process Control
- Staff authorisation and performance matrix





# Procurement

With the bulk of your manufacturing cost accumulated through materials, our objective is to get you the best price, best product at the shortest lead times.

Our procurement teams are located in Albany and Shenzhen, China, and are dedicated to sourcing components from all around the world. Our teams have exceptional skills and experience working with global suppliers to ensure we get the best stocking options to suit your requirements.

We can source any component you need, from PCBs, electronic & mechanical components, tools or packaging. If you already have stock on hand or would like to maintain some level of the supply chain, we are happy to work around whatever works best for you. We can source and supply just part of your build requirements, and if your production run is relatively small you can take advantage of our components that are bought in larger volumes at more competitive prices.

#### Traceability

Utilising our custom-built ERP system, we can offer aviation level traceability options complete with component level Certificate of conformance and setup supply chain and reporting for UL requirements.

#### Visibility

Our customer web portal allows you direct access to purchasing information for your product including product stock status, delivery schedule, liability and stock on hand reports.

### **Certificate of Conformance**

Our team and systems are equipped to offer a certificate of conformance for your products. We can track all products down to part level if this is part of your requirements.

This is particularly important with high-spec products and where safety is a non-negotiable.

#### UL

Our facilities are equipped to handle processes that deal with UL certified product. If you have UL certified products or are working towards UL certification, please talk to us about our processes in part sourcing and buying in multiple volumes. The New Zealand UL Auditor has worked with the QC systems so in partnership with QC is able to effectively keep your product UL certified.

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# Manufacturing

We know that every customer of ours has their own unique requirements and challenges, and we understand that this is no different for your customers. That is why we take the time to listen and focus on the problem that needs solving.

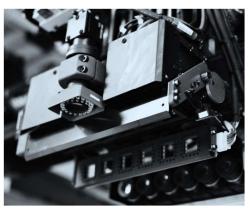
This enables us to deliver configurable solutions that meet your customers' demands, which takes the pressure off you and your team, so you can concentrate on R&D and growing your business.

At QuickCircuit our expertise isn't solely limited to PCBA manufacturing but extends into all areas of manufacturing such as mechanical engineering and box build assembly. Our engineering team are on hand to support and guide you every step of the way.

Our procurement teams work closely with engineering and packaging suppliers on final assembly components, establishing forecasted and buffer stocking options to gain the best price while minimising your lead-time.

Our production assembly teams build product to Kanban-ready distribution systems so we can deliver in the shortest possible timeframes.

We will work with you to tailor design solutions and product configurations specific to your customer's needs, from start to finish.



#### Surface Mount Technology

Our automated surface mount production lines consistently deliver top quality assemblies for a diverse range of technologies.

With our strong emphasis on Statistical Process Control (SPC) we continually analyse our systems to eliminate potential quality issues, ensuring our customers receive world class assemblies first time.

Our in-line SMT manufacturing lines consist of:

managers and technicians.

- In-Line Fully Automatic Screen Printers With repeatability performance of ± 12,5µm @ 6 Sigma the Erka X4 offers extremely high levels of precision.
- Advanced Pick & Place QuickCircuit utilises Samsung SMT placement machines. These machines provide 100% optical pre-placement component inspection, allowing the placement of the very latest SMT components such as micro pitch QFP's, BGA's, CSP and other new generation packaging technologies. QuickCircuit regularly invests in new placement machines and upgrades, with our latest

 Automated Inspection Systems – Using Mirtec AOI equipment we can thoroughly inspect our PCB assemblies to ensure they meet our stringent quality requirements. The very best in automated optical inspection equipment provides consistent in-line monitoring of all surface mount assemblies with real time feedback to production



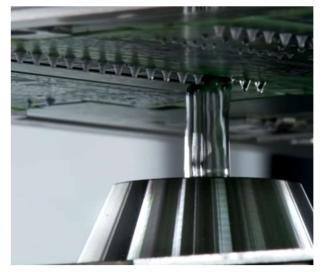


## Manufacturing cont.

#### **Selective Soldering**

The area of through-hole soldering continues to develop and QuickCircuit remain committed to ensuring we have the latest equipment to meet quality and throughput requirements. To do this we have invested in selective soldering machines to enable pin by pin soldering on double sided SMT PCBA.

 EBSO SPA Selective Soldering Machines - These machines come fully equipped with multiple nozzles and fluxers to ensure we can precisely manoeuvre around SMT components. Each machine is individually configured by product to maximise throughput while ensuring adequate barrel fill is achieved to meet IPC class requirements. They are nitrogen filled via our in-house nitrogen generator delivering 99.999% purity to guarantee the perfect solder joint.



#### **Conformal Coating & Adhesive Application**

Products requiring repeatable precise conformal coating or adhesive application are processed through our robotic applicators and fume chamber. These applicators are capable of precision-controlled dispensing and spraying, removing the risk of over or under application, ensuring consistent throughput.

#### **Mechanical Assembly**

When it comes to mechanical assembly you need a team who will work with you to reduce assembly time by utilising lean manufacturing methodologies while providing advice on design and assembly jigs.

Cycle time is a big focus in our mechanical assembly area. If a product isn't designed for lean manufacturing, then costs can quickly escalate. Every detail surrounding component selection, accessibility to fixings and tool selection needs to be well thought out. Therefore, we offer to work with you from the early stages of design, to ensure you are guided in best practice design principles that will ultimately result in a lower cost assembly



### Manufacturing cont.

#### **Firmware Programming & Functional Testing**

When it comes to quality control, no assembly-level inspections can surpass the confidence that is assured by undertaking full functional testing.

To ensure no internal component level or PCB trace failures exist, we recommend every unit is run through a functional test jig

as part of an in-line production process. By doing this, any failures can be recognised, and feedback given directly to the production teams and engineers without delay.

We can provide advice, basic design and even build low level functional testers for you, but we strongly recommend you invest in advanced automated testers which cover off all aspects of functional testing for your product.

By utilising fully automated testers you can remove human error from your testing process and further lower your production costs to achieve a cost neutral process.



#### **Other Manufacturing Services**

- Cable Manufacture In-house stripping and crimping machines ensure we don't have to outsource simple cable manufacturing.
- Labels & Packaging With worldwide contacts and in-house printers we can design and produce custom labels with unique serial numbers in an in-line production environment.
- Environmental Chamber Our environmental chamber allows you the option of processing units through a range of humidity and temperatures prior to functional testing, to further grow your confidence in your design and our processes.



# **Engineering Support**

Our engineering team works closely with our account managers, customers and our production teams so that everyone has all the information needed to streamline new product introduction. This team has extensive knowledge in all areas of manufacturing from electronic design through to PCB panelisation and mechanical engineering. They live and breathe best practice lean manufacturing concepts and are on hand to provide any assistance they can in your design or production process.

#### Product Risk Analysis (PRA/FMEA)

We spend the time upfront to analyse all aspects of the manufacturing pack, ensuring we are ready for production and take time to identify areas of concern that may need further process controls when production starts.

#### **Design for Manufacture (DFM)**

A by-product of the PRA and PFMEA process will be a DFM report. Any areas of concern we identify with the design of the product, or potential areas of failure, will be documented and delivered to you for review, before you commit to material and production.

#### **PCB** Panelisation Stencil Design

A well designed PCB panel will drive down cost of material, production processes and result in lower production failures. Our experts apply best practice to limit unnecessary fabrication processes and material, while ensuring the PCB meets production requirements for size, rigidity and throughput. The stencil design is critical to SMT production quality, so a lot of time is placed into the design of these apertures.

#### Work & Audit Instructions

The engineering team will advise and assist in the building of our internal work instruction documents. This is a live paperless system that allows for quick documented changes to be undertaken and given to the production line without delay. Further to our work instruction system, we have an in-production auditing system that alerts our line leaders to the requirement of a product audit based on set AQL limits.

#### **Engineering Changes (ECN/ECO)**

Documentation, documentation, documentation! You're only as good as your documentation and that is very true when it comes to engineering changes. Our strict and yet agile ECN processes, Bill of Material databases, combined with our process control systems mean your product changes, recalls and stop shipment requirements are in the best hands.

#### **Incoming Inspection**

When it comes to receipt of material from global suppliers, we take the time to ensure the component we have received is the component you wanted. Through the identification in the PRA/PFMEA process, or via supplier auditing we may identify the need for further checks to be conducted before we accept components into production. We will design and implement incoming inspection requirements.

#### **Non-Conformance & Corrective Actions**

An outcome of our production systems, auditing and component inspection failures is our non-conformance and corrective action system. This system drives continuous improvement in our facilities with all detailed reports available for our customers.

# **Quality Systems**

The QuickCircuit Quality Management System is planned, implemented and reviewed while considering the context of the organisation and the requirements of its relevant interested parties.

The scope of AS9100:2016 & ISO14001:2015 applies to the Auckland and Christchurch sites and includes all products, their manufacturing, their delivery and their recycling and are processed under the control of the quality management system. The system is used to minimise the environmental impact of QuickCircuit as an organisation and all significant aspects are reviewed. The system complies with all regulatory requirements and is driven by the quality and environmental objectives defined by management.

#### Quality

Since QC was founded we have always based our processes on the best practices of the ISO9001 standard and since 2011 have held ISO9001 certification.

Over the last decade, QuickCircuit has become a chosen supplier to the aerospace industry throughout New Zealand and in October 2019 QuickCircuit successfully gained certification for AS9100D, the Aviation, Space and Defence standard for Quality Systems. The AS9100D standard carries with it all items relating to ISO9001 as well as additional specific requirements for the aerospace industry. This was a monumental achievement for our business and one that cements QuickCircuit as a leader in electronic manufacturing.

If your product needs the kind of controls and processes robust enough for aerospace assemblies, talk to us about how we can enable these on your products.

#### Environment

As an environmentally aware company, QC stringently monitors all environmental aspects of our work and considers impacts to the environment as part of this.

As part of our commitment to the environment QuickCircuit is certified ISO14001:2015

#### Training

QC has invested in an in-house IPC-A-610 Certified Trainer to train QC staff in this worldwide recognised inspection criteria for electronic manufacturing. Having the trainer in-house allows for on-going training of staff in the IPC requirements as well as offering training to customers.

Should you wish to be a part of a training course that QC is running for IPC, please discuss this with an Account Manager who will be happy to help you be part of an upcoming course



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IPC-A-610

**Certified IPC Trainer** 

# **Process Control**

We employ a real-time analysis of the production process through Statistical Process Control (SPC) to identify problem areas on the production floor as it happens. This allows corrective actions to be taken immediately. The key advantage is the elimination of errors at a very early stage in production and with previous build data available it enables issues to be prompted ahead of time.

Traceability is an integral part of the QC manufacturing system. With the entire ERP system built in-house from the ground up, the processes and tracking systems that are used within QC allow for traceability of specific components down to the board level. Our traceability enables QC customer reporting that reflects any potential for failure within specific units if a manufacturing or component defect is found. This system meets aviation level traceability requirements and allows our customers to review or recall specific batches of product.

Every PCBA produced is given a unique alpha-numeric 2D unit ID barcode that is scanned at each stage of the manufacturing process. Each PCBA must have been scanned as passed before it can move on to the next stage or be shipped. All QC-sourced components are tracked via QC part numbers that contain specific manufacturers' batch code information which is logged against every batch of components ordered and received.

The combination of PCBA barcode tracking and QC part number batch tracking means we can provide customers with the ability to batch track all levels of their product to the levels required for Aviation, space and military industries.



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QuickCircuit uses the following SPC techniques to ensure a high-quality end-product:

- Factory Projected Real Time Factory Floor Monitoring.
- Skills Matrix Operators only with the correct skill level can perform work on a job
- AOI (Automated Optical Inspection) A High Resolution Camera inspecting every component on the board.
- PRA (Product Risk Analysis) Performed on build information with alerts to the floor and management.
- Full traceability Products down to PCB/component level.
- Route Authorisation Ensure products have gone through all their required processes and have passed.
- Paperless Production Environment All documentation, pre-job reviews and work instructions provided via multimedia and web.
- Customer Web Portal View manufacturing BOMs, any ECN's or concessions, the Manufacturing routes in real-time plus emailed Track & Trace functionality.



## **Distribution & Warehousing**

We want our customers to be able to focus their attention on innovation and business growth without being caught up in managing orders and dealing with freight companies.

At QuickCircuit, we provide a distribution and warehousing facility so we can deliver direct to you or your customers when its ordered.

We have options to build your product to Kanban driven buffer systems so it's ready to go the moment you receive an order. If you provide your customers options of configurable assemblies unique to their requirements, then we will tailor design a system and solution that removes the headaches from you while maintaining a reduced lead-time. The benefits to you are obvious:

- Space taken up with finished goods in your office can be reutilised for more value-add projects
- No need for extra staffing or on call personnel to carry out your shipping or distribution.
- By taking advantage of our full turn-key manufacturing and distribution services you can focus your time and attention on R&D and business growth.





# Web Portal

Our customers are provided with a secure login to our Web-portal which enables you to check the progression of your order through production. Our system offers a lot of transparency that enables you, the customer, to see as much as possible about your products' journey through QC.

QC provides a free web portal tool which enables the customer to easily and quickly view all details regarding their products and production with us.

Some of these features include:

- Real time reporting
- ECN & concession information
- Open and Closed order visibility
- Order stock status and part forecast
- Bill of materials for each product
- Customer stock on hand details
- Liability reporting
- Track and trace production through factory
- Traceability to aerospace standards



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# Working with us

#### Communications

At QuickCircuit we believe that communication is critical to a successful relationship. From your first interaction with us, you will be assigned a single point of contract through an Account Manager who will work for you to take care of your requirements, project manage your production orders and undertake any required changes. As the project manager the Account Manager is your advocate and will pull on all necessary resources within QuickCircuit from purchasing to engineering, quality to production, to ensure your requirements are met, at every turn.

#### New Product Introduction & Quote

Firstly, supplying us a well-documented BOM with key information around your expectations and requirements will help us deliver a fast and competitive material quote.

Requirements such as;

- Leadtime
- Liability limits
- One off order or ongoing
- Price expectations

#### Bill of Materials

Best practice Bill of material information;

- Your part number (P/N) this will be imported into our system and helps when matching future BOMs
- A highly detailed description the part including any specific voltage and tolerance values.
- Single reference / designator per line this speeds up the process of importing the BOM into our systems.
- The manufacturer of the part and the manufacturer's part number. This reduces the confusion over what part you are specifically asking for. If manufactures part numbers aren't easily attainable, it also helps if you have a Digi-key, element 14 *etc.* part number which we can use as a reference.
- The package type; again, this helps when cross checking the part, we are ordering with the size of the component you believe it to be.
- Finally, the additional comments area where you can add any extra information which you think may be helpful. Information such as whether alternatives are allowable can help to reduce your minimum pack quantities and lead times.

The time invested in a good BOM is well worth it. Potentially you can reduce cost, liability and lead time. It also allows QC to get a guote back to you more promptly with less chance of error.

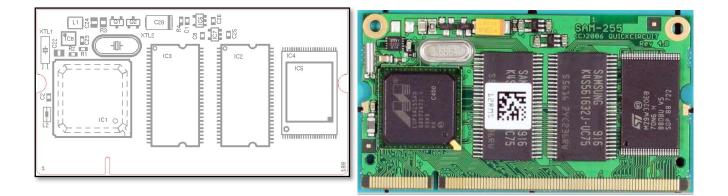
P/N	Description	Ref	Qty	Mfg	Mfg P/N	Package	Comments
ERU101	CAP ELECTROLYTIC CASE F 220U 20% 35V	C1	1	PANASONIC	EEVFK1V221P	CASE F	
ERU101	CAP ELECTROLYTIC CASE F 220U 20% 35V	C2	1	PANASONIC	EEVFK1V221P	CASE F	
ERU102	CAP NPO 0805 1N5 10% 50V	C3	1	AVX	08055A152JAT2A	0805	OTHER EQUIVALENT BRANDS OK
ERU103	CAP X7R 0603 1N 10% 50V	C4	1	AVX	06035C102KAT2A	0603	OTHER EQUIVALENT BRANDS OK
ERU104	DIODE 1PS76SB10 SCHOTTKY BARRIER SOD323	D1	1	NXP	1PS76SB10,115	SOD323	Contraction of the second s
ERU105	IC 74HC02D QUAD NOR GATE SO14	IC1	1	TEXAS INST	SN74HC02D	SO14	ALTERNATIVE FAIRCHILD MM74HC02M
ERU106	IC PIC12F675-I/SN MICRO SO8	IC2	1	MICROCHIP	PIC12F675-I/SN	SO8	Second and the second
ERU107	LED 0805 GREEN DIFFUSED	D2	1	AVAGO	HSMG-C170	0805	
RU107	LED 0805 GREEN DIFFUSED	D3	1	AVAGO	HSMG-C170	0805	
ERU108	RES 0805 4K22 1%	R1	1	YAGEO	RC0805FR-074K22L	0805	OTHER EQUIVALENT BRANDS OK
RU108	RES 0805 4K22 1%	R2	1	YAGEO	RC0805FR-074K22L	0805	OTHER EQUIVALENT BRANDS OK
ERU109	RES 0805 200R 1%	R3	1	YAGEO	RC0805FR-07200RL	0805	OTHER EQUIVALENT BRANDS OK



#### Overlays, Photos, Samples

A picture enables us to truly see the complexities and processes which are required in producing your product. Below you can see an example of good board diagram which clearly shows us the reference designators and orientation of any part which has a specific polarity.

Photos and a sample of the product can also be very helpful as they provide another level of product detail.



#### Work Instructions

When it comes to final assembly process, detailed photographic step by step work instructions are critical to ensuring we undertake assembly to specification.

In many cases customers engineering staff members have put together prototype units only and have not had the capacity to undertake fully fledged work instructions. We are happy to work alongside you to develop these instructions as part of a pilot build, and ensure that as part of our FMEA process we identify the critical steps in manufacture, and install adequate control mechanisms to prevent failure.

Talk to us about how we can assist with work instruction creation alongside our failure mode and affects analysis process



#### Printed Circuit Board

The PCB is a critical custom component of every design. When ordering this item there is a check list we work through as there is a huge range of potential PCB options. Some PCBs are simple single-side boards with large tracks and clearances; others are very high-density multi-layer boards with carefully controlled layer stack ups with controlled impedances.

When supplying PCB data to QC, please use the "*PCB Specification.pdf*" document. This will help when placing orders to our PCB fabricators.

#### Testing

Depending on the level of sophistication required, QC can directly assist or work with specialised third parties in developing test solutions. In most cases it is you, the customer, who has the detailed knowledge and can develop testing for the specifics of your own product.

Typical test solutions in use at QC are, AOI (Automatic Optically Inspection), Electrical tests via Custom bed-of-nails jigs, Specific Functional Tests and various combinations of the above. We can also offer IT support to record test results by each unit tested if required.

If you are not experienced in developing test solutions, we strongly suggest talking to us about your approach before confirming the way forward.

#### Label Requirements

At QuickCircuit we can undertake and control any labelling requirements you may have. We have the capabilities to printing and control product, including model and serial number with logos and other information and have all this data cross linked back into our database to ensure we meet any traceability requirements.

#### Information required

Paper or polypropylene (UL Certification) Logo or another image Size of font/Type of font Address Product number Other specifications or data

Please talk to our account managers if you seek more information.

#### Quote

Once your requirements are known and we have evaluated all material and labour requirements you will be issued with a quote from your Account Manager. This quote will outline the product particulars, a long with the labour and material costs, lead times and added fees for things such as tooling, machine setup and testing or assembly jigs.

The quote will also contain a section regarding the expected maximum liability costs. This section relates to the added costs that are required in order for QuickCircuit to meet the per unit price. Liability is a function of supplier MOQ and is something we do our best to manage as best as possible to minimise risk. Liability is payable on any component that has not been used after 90 days. Speak to your account manager about how best to maximise the benefits of liability while ensuring risks are realised.



#### Manufacturing Agreement

For sporadic one-off projects we are happy to work with you on a quote, purchase order and delivery process. When you are ready and once it comes time for ongoing work we would love to sit down and talk together about how we can ensure you are getting the most value out of our services.

A manufacturing agreement provides the base for a successful long-term partnership where we can work closely on competitive pricing, material supply arrangements, and ongoing access to additional resources such as distribution teams, technicians, design engineers and quality systems advisors.

Talk to your account manager about setting up a manufacturing agreement and ensure you get the most out of our capabilities while you focus on your next product.

## **Policies**

All QuickCircuit policies and certifications can be found on our website www.quickcircuit.co.nz



