



THE NEWS

CIRCUIT

Newsletter of the Newbury Electronics group of companies



Manufacturing
QUALITY PCBs

From the MD



Welcome to The News Circuit, issue 7. Sixty years ago Newbury Electronics entered the electronics market - at a time when single-sided, single-layer PCBs were the norm and when the terms 'technological revolution' and 'integrated circuit' sounded like science fiction.

With each new decade has come a mini-technological revolution in electronics design and manufacture and we are proud to have kept pace with all the latest developments, including laser imaging, digital inkjet printing, SMD placement machines, laser cut solder paste equipment, and x-ray based inspection techniques to facilitate a high level of service and increase productivity.

A few of those milestone investments are detailed in the stories here, so you can see for yourself just how that revolution continues to bring new opportunities and changes the pace of business for our company and clients. Just imagine how the next sixty years will shape up!

Philip King
Managing Director. 

The brightest star - Antares 700X lights the way

Antares is one of the largest and most luminous observable stars in the universe, so it's an appropriate name for a machine which can literally light the way, using x-rays, to identify multiple targets in multi-layer PCBs and to then drill through holes.

By means of x-ray identification of multiple targets, the Antares 700X x-ray hole drilling machine drills tooling holes to enable us to achieve tightly registered multi-layer PCB through holes after bonding. It is an essential tool for production of both high layer count and high density interconnection PCBs.

Recently taking its place in the drilling shop, the machine detects the centres of those targets that have been chosen to represent the internal lay-up, automatically compensating for enlargement/shrinking, and eliminating registration errors. Once hole positions have been calculated, the holes are drilled at a rotation speed of 30,000 rpm. 



AT A GLANCE

Welcome to Issue 7 of
The News Circuit

- Page 2 New 'factory tour' videos released.
- Page 2 The 'legend' that is the new Craftpix printer from Microcraft.
- Page 2 First Article Inspection gets three Extra Eyes.
- Page 3 Hi-res 3D capability of the new CyberOptic SQ3000 AOI machine.
- Page 3 Copper clean-up for purer water.
- Pgs 4-5 60 years old - NE prepares for the challenges of the next sixty years.
- Page 6 Intelligent compressed air supply minimises energy usage.
- Page 6 NE now the largest user of SMD pick & place technology in Europe.
- Page 7 PTH improved with even better resin smear removal line.
- Page 7 Refurbished effluent treatment plant means more recycled water.
- Page 8 Improved DI water plant now saves waste water.
- Page 8 Every hole has a copper lining - new hand-held device measures thickness in an instant.

New factory tour videos released

Acting as 'tour guide' on his factory walkabouts, with potential clients and other interested groups, is a regular occurrence for Philip King.

So, to reach more people and give an intrinsic view of the work of Newbury Electronics, we've launched a series of videos to explain PCB manufacturing and the assembly and testing processes.

Presented and narrated by Philip King, each video takes you step-by-step through all stages of production from ordering to despatch, including CAD/CAM tooling, the machinery and technology used, and quality control procedures - just like a 'live' factory tour - even touching on the company's waste management and recycling policies.

Thoughts about making the factory tour videos first kicked off after last year's published short videos which take a light-hearted look at both Newbury Electronics and PCB Train. The full factory tour videos have also been made available as separate chapters and we've utilised some of the footage to produce some cameo comedy videos, too.

No persons or animals were harmed during the filming! 📹



SEE MORE

Go to the videos page

A lifetime in its own legend

Legend printing - the white markings and identifiers on the surface of a PCB - uses an industrial-sized version of the inkjet printing process familiar to desktop printers.

We have recently taken delivery of a new Microcraft Craftpix MJP6151 KM/CPL legend printer, which is the latest generation of legend printer from Microcraft of Japan, and which replaces our earlier machine. Microcraft, established in 1972, continues technological improvements that maintain its position as a world leader in product development and customer satisfaction, so we're expecting a great performance and a long life from this new addition to our inventory. 📹



Keeping an extra eye (or three) out

First article inspection (FAI) is a very important step in the PCB assembly process, so it's vital that the checks we make are extremely accurate.

These machines are designed to automate component placement verification of "first-off" electronic assemblies using a moving camera. The equipment employs a hardware/software based system designed to assist any level of operator in the FAI process.

We have three identical inspection machines because we need to minimise the waiting time when our SMD placement machines are idle awaiting checking and approval of the first article. The machines visually identify that each component placed is in the correct position, the correct orientation and is, in itself, the correct component. 📹

Left: One of the three Extra Eye installations.



Optical inspection just got smarter

Automatic optical inspection (AOI) enables fast and accurate inspection of PCBs and electronics assemblies to ensure that the items are built correctly and without manufacturing faults.

The CyberOptic SQ3000 "3D" AOI is a new generation AOI machine incorporating not just high resolution 2D cameras, but also high resolution 3D mapping of the surface contours of an assembled PCB. Inspection is not just based on colour images, but also on any specific dimensions that we choose to inspect. For example, these could be the height of the soldered legs of an IC. Any bent or lifted legs could be an open circuit. Or perhaps a faulty BGA placement would reveal itself by a measurable slight tilt. Nether fault is visible by downward looking cameras. 



Band filters clean up

Pictured here is one of two ARO band filters installed in our PCB manufacturing facility at Faraday Road.

These simple filtration devices have helped us to substantially cut our water consumption by removing copper contamination at source. During surface preparation of PCBs, surface copper needs to be finely mechanically brushed which process removes grains of copper. Water sprays lubricate the brushes, and this copper is removed from the spray water at source by the 12 micron ARO band filters. 

Newbury Electronics · 60 YEARS OLD · embracing the future electronics revolution

It is over 150 years since the first electrical connection boards - metal strips mounted on to wooden boards - were produced. Jump forward about a hundred years and this is when Newbury Electronics entered the electronics market, undertaking secondary machining on carburettors and providing circuit boards to the AWRE (Atomic Weapons Research Establishment) and ICL (in its former guise as Leo Computers).

Originally installed in a small warehouse on the A4, Bath Road, at Thatcham in 1956 - this is now an American Golf Shop - Newbury Electronics enjoyed the burgeoning business created by a massive upturn in the market for electronics design and manufacture. The first circuit boards off the production line were simple print and etch PCBs with all the holes drilled manually one at a time.

After a few years, the company moved to West Mills, on the banks of the river Kennet, where it occupied two buildings not far from Newbury Bridge, at the south end of Northbrook Street. The nearby bridge, built in 1878, was a very busy place since it carried most of the north/south bound traffic

over the river Kennet until the first town by-

pass was constructed in 1963. Interestingly, a temporary bridge was built in 1944, 200 metres to the east, to transport tanks for "D" day and is still used today.

In 1979, an opportunity arose to move to the London Road industrial estate, just outside the town. Newbury Electronics built a new factory in Faraday Road. Further investments in the 1980s introduced double-sided plated through hole circuit boards, CAD/CAM technology, laser plotting and automatic optical inspection. By the early 1990s multi-layer circuit board technology was added to the company's capability.

Despite predictions that everything would fail as the millennium

arrived, technological and engineering innovation continued. Newbury Electronics extended its services to electronic assembly. A substantial nearby electronic production facility has been developed capable of assembling and testing the most sophisticated surface mount components.

Electronics now permeates every product imaginable. It is estimated that sometime in 2016, the number of connected devices will overtake the number of people on the planet for the first time. Each and every one of those devices requires a PCB.

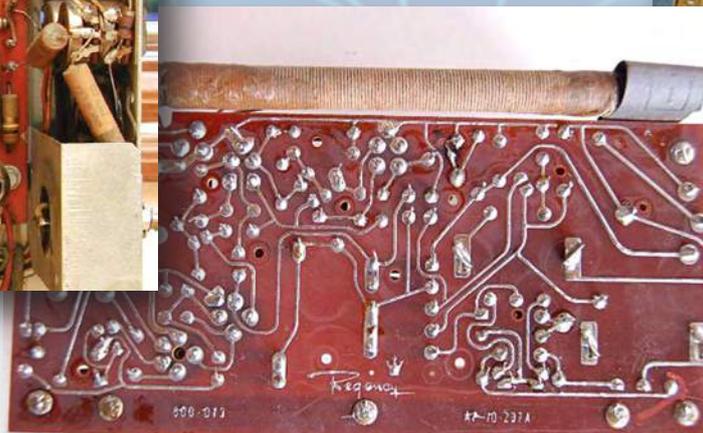
Just as the early pioneers could probably not have envisaged electronic devices that we now take for granted, so it is for us today when we think about the future. It is impossible to know for sure what might arise. Wearables and other new products and solutions that are still in the design stage may be upon us in far less time that we might expect and PCB design and manufacture will need to respond. Miniaturisation will continue, but at the same



STATE OF THE ART ELECTRONICS



A selection of typical 1950s circuit boards. Notice the valves (vacuum tubes) in the picture above. All parts were placed and soldered by hand.



time the boards will become increasingly complex. This will require an increase in the number of layers in a board but not an associated increase in thickness or a compromise on the board's physical strength or functionality.

Technological developments that are already being explored in the aerospace and military markets will spill out into wider commercial applications and will utilise new approaches. These are likely to include the evolution of thick and thin technologies, embedded actives and the use of new substrates that will further enhance PCB performance. Laser- rather than mechanically-drilled PCBs are likely to become the standard because of the high pin count and complexity of modern components.

There is no doubt that the last 60 years have been an exciting time for the electronics industry and that PCB designers and manufacturers are going to be pivotal in how it responds to the opportunities and challenges of the next 60 years.

Newbury Electronics intends to be at the forefront of technological development, providing easily accessible electronic production services at a reasonable cost. 



Top: The site of the first factory on Bath Road at Thatcham, just along the A4 from Newbury.

Second from top: West Mills. Newbury Electronics occupied the second and third buildings on the right-hand side, across the water, coming back from the bridge - now in use as residential flats.

Third from top: The company moved to its purpose-built Faraday Road factory on the London Road industrial estate in 1979 and continues to operate its headquarters and PCB manufacturing from this plant.

Left: The Assembly Division at Ampere Road, just a stone's throw from HQ at Faraday Road.

2076 ?



Intelligent air supply cuts energy usage

A reliable compressed air supply is vital for PCB production, to convey components pneumatically, to operate sensitive valves or blow the boards clean.

We need to have two compressors, one being always the back-up to the other. The New Atlas Copco VSD machines (pictured, left) are part of a new generation of variable speed drive (VSD) machines, which sense the load required when online, and adjust the output of compressed air accordingly. This minimises the energy wasting on-off cycling which single speed compressors are notorious for when used at less than maximum load. Our electricity consumption for supplying compressed air has been halved. 



Nine Pick & Place lines now installed

The assembly division of Newbury Electronics is well equipped with high-specification SMD pick and place machines.

We have two SMD placement shops, our smaller shop has 3 machines and this picture (right) is of the larger one showing six Yamaha I-pulse M20 SMD placement machines installed.

These machines are 01005 capable which are tiny indeed. Most PCBs have 0402 (1.0mm x 0.5 mm) size components with 0201's (0.6 mm x 0.3 mm) being the very smallest SMD parts we regularly encounter.

The M20 machines will place 01005 SMD components almost half smaller again (0.4 mm x 0.2mm). We are the largest user of Yamaha I-pulse M20 SMD placement machines in Europe. 



The end of the line for resin smear

The plated through-hole (PTH) process demands a continuous, void-free, fine-grained and adherent copper deposit on the inside walls of each hole.

Before copper can be plated down through holes of multi-layer PCBs, the inner layer copper pads must be cleaned of any resin smear left after drilling.

The Muscat permanganate desmear line achieves this by using permanganate formulations to etch the resinous materials away. This new line is a larger and better controlled replacement for our existing unit. 



Cleaning up our act for purer water

Activated carbon filtration is effective in removing certain organics (such as unwanted micropollutants) from water.

Our effluent treatment plant has been refurbished and rebuilt so that we recycle as much clean water as we can, and safely clean up our waste water by using this filtration method.

With over one ton of active carbon at its heart, the system uses technology based on the adsorption of contaminants onto the surface of a filter and the main component in that process is the blue tower which houses the activated carbon.

The water we now discharge to drain is cleaner than when it arrives at the building. 

The refurbished effluent treatment system removes contaminants by using active carbon filtration.

Re-using water for DI

An industrial de-ionised (DI) water system can help to reduce operating costs, improve efficiency and lessen a company's environmental impact.

We use about one cubic metre of de-ionised water per hour, and we have rebuilt our DI plant incorporating UV light treatment to eliminate algal growth. The feed water for the DI plant is now taken from water used for cooling exothermic chemical processes which was previously discarded to drain. 



Measuring copper thickness

To ensure proper function, it is critical that the copper hole lining in PCB through-holes is of a uniform thickness.

The Oxford Instruments CMI 511 Plated Through-hole Measurement Gauge is a small, expensive and very useful device which measures the thickness of plated copper in the walls of through holes in an instant. This hand-held device is so fast and easy to use that we can constantly check the copper plating quality ensuring that we produce top quality PCBs. 



CONTACT US

HEAD OFFICE:

Newbury Electronics Ltd
Faraday Road, Newbury, Berkshire
RG14 2AD UK

t +44 (0) 1635 40347
f +44 (0) 1635 36143
info@newburyelectronics.co.uk

www.newburyelectronics.co.uk
www.pcbtrain.co.uk
www.circuitmission.co.uk

ASSEMBLY ONLY:

Newbury Electronics Contracts Division
Unit 6, River Park Industrial Estate
Ampere Road, Newbury
Berkshire RG14 2DQ UK

t +44 (0) 1635 529799
f +44 (0) 1635 524382

assembly@newburyassembly.co.uk



BS EN ISO 9001 Certificate Nos: FM40205 & FM24949 UL Approval (ZPMV2.E132578)



facebook.com/PCBTrain



twitter.com/pcbtrain

For more news and views see Philip King's online blog

READ MORE

