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## Further Investment at Kepston

Kepston Limited adds to its impressive investment record over the past three years. Established in 1916, Kepston continues to invest in core activities.

“During the past three years over £2 million has been spent on building work and new plant on both sites. A new Hauser H35 CNC jig-grinding machine (see below) is due for delivery February 2014 at a cost of £600,000, bringing the total investment to over £2.6 million.

Kepston has certainly put its money where its mouth is with the exceptional investment program based on the size of the company. It is vital to us that we can meet the ever-increasing demands of our customer base, in terms of delivery, quality and efficiency. We needed to make

these investments to secure our position as leaders in our areas of activity in the UK.

Kepston has extended its capability both in the range of processes available as well as the physical size of components it can process across both sites. The core processes of jig grinding, universal grinding and furnace brazing of both mild steel and stainless steel components, have all benefited from the investment programme. Both sites in Aldridge and Wednesbury have had the latest equipment installed ensuring the future performance expected from the market sectors we deal with.

Already the next investment is scheduled for late 2014 to add another brazing / heat treatment process to the Wednesbury site, giving it a

new set of markets to visit, further strengthening the future.

As Kepston’s centenary approaches in 2016, the company has never been in such a good position to take advantage of the opportunities presented by customers. I am very proud of all the Team at Kepston who have worked exceedingly hard to put us in such a strong position. The company has responded with this aggressive investment activity, which should secure the future of our employees as well as continuing to offer our customers a world class supplier.”

**Brent Millage,**  
Managing Director.



Hauser H35 CNC jig-grinding machine.

“Investment  
still key to  
growth at  
Kepston”

# A Few Words from the Team...

## Tony Smith - Works Manager Wednesbury



"The last 2 years have seen some substantial changes in Wednesbury. The loss of key personnel due to retirement could have been a major issue. With 4 additions to the team I feel Kepston is much stronger and long may we continue to reap the benefits of their respective input. We wish Arthur and Kay many happy years in their retirement.

The investment in the right equipment continues. Two years ago we increased capacity with another Mahler controlled atmosphere furnace. Within the last twelve months we have seen a complete redesign and overhaul of the Delford exothermic generator. Coupled with the addition of an industrial cooling unit has enabled us to double the capacity available for non-ferrous/low temperature annealing while maintaining the high quality finish of the product.

July ushered in the renewal of our truck contract and it's great to see the Mercedes badge in partnership with the Kepston livery, both the drivers report a much improved ride over the previous vehicles. Kudos to the wag that suggested Keith and Malcolm should be renamed Nico and Lewis, although I'm not entirely sure the full F1 race suit and helmet is appropriate for delivering around Birmingham.

The training programme encompassing health and safety aspects as well as the more direct 'on the job' has been gaining pace. The remote H&S training has proved very successful and the number of people with a wider skill diversity has grown. This commitment to people training in conjunction with right kit will stand Kepston in good stead for all the future challenges."

## Andy Oakley - General Manager Aldridge



"In the past three years Kepston have invested in 4 new C.N.C machines. The investment has enabled Kepston to increase sales year on year and gain a greater market share in the low volume, high value precision components/tooling business.

Together with strong investment and the addition of 4 new members to the team, here at Aldridge, we have achieved the aims of the outgoing business plan. The future looks very bright, the latest machine arrives in February 2014, and continued investment in people, training /multiskilling combined will be a major factor in achieving the targets set out in the next two year business plan.

I would like to take this opportunity to thank the team for their support over the last two years, it has been a difficult time for me and my family but I work with a team of people who could not have been more supportive and compassionate. Thank You."

## Alan McCracken - Sales Manager Wednesbury



"It seems a long time ago since we did our last Newsletter, oh my, where does the time go? First of all, a big welcome back to Kevin Clarke - quality manager - who used to be with us but left and has returned to the fold and is partly responsible for getting this Newsletter off the ground again. Kevin's knowledge and enthusiasm is welcomed by us all. We have also had a new maintenance team with Gary and Luke. Add to these 3 people, Brad (admin) who also joined us this year, I feel the team has further been strengthened which is excellent news for both the company and our customers. It's been a strange year. On one hand, business is good and the future sounds even better, yet we have had more customers go into liquidation this year than I have experienced in 33 years at Kepston and having gone through 4 recessions. News such as more and more work seems to be coming back into the UK and JLR having the confidence to build a brand new factory on our doorstep, all bodes well for the future. A massive thank you to all our customers for their ongoing support ."

## Kevin Clarke - Quality Manager



"After an extended absence I was asked to reprise my role at Kepston within the QA department albeit as Quality Manager instead of Quality Engineer, to me the opportunity was a "no brainer" and I was more than happy to return to the fold. The teams at both sites are stronger than ever and I am most fortunate that our employees have a "quality conscience" and one overriding goal, satisfying our Customers' needs and exceeding their expectations. Our staff have a proactive approach to Quality and often anticipate potential Customer issues creating solutions before the undesired happens.

Thanks to the team for your "can do" approach and for embracing the significant changes that have taken place over the past eighteen months to our quality system, we are seeing considerable benefits as a result of the improvements and your co-operation."

# The Technical Bit...

## Furnace Brazing

Despite the process being around for decades, furnace brazing is still one of the least appreciated manufacturing techniques with many engineers being unaware of its actual existence or of its advantages as a method of joining two or more parts together. Whilst most people are aware of brazing with a flame and many people have done so on DIY applications at home, furnace brazing can offer many advantages over other brazing methods.

Kepston carry out the process using furnaces with protective atmospheres. This removes the need for a flux, there is no potential for voids due to flux and as the parts are not brazed in air, there is no requirement to remove oxidation after brazing as the parts will be clean and bright. In many cases, cleaner parts can reduce plating costs as minimal cleaning is necessary. In many cases, OEM's now require the bores of tubular assemblies to be as clean as the outside, with furnace brazing, the bore is as clean as the outside. Clean parts also plate better and therefore can give better corrosion resistance.

Because the complete assembly heats up as a whole in furnace brazing, all the joints are brazed at the same time, in the case of heat exchangers, this can be many 100's of joints. This can offer significant cost savings over say flame brazing or induction brazing.

Furnace brazing de-skills the actual brazing process as this is carried out inside the furnace, whereas hand brazing and welding require individual skills.



### Typical Applications

The list of potential applications is endless, however, the most common categories include; Hydraulic Fittings, Heat Exchangers, Tube Manipulations, Machined Assemblies, Pressed Assemblies, Fabrications and Wire Formed Assemblies.

### Joint Design

Brazing relies on capillary attraction. Therefore, joint design and cleanliness is crucial in the success of the process. Different brazing materials require different brazing gaps. Kepston primarily use either copper or a range of nickel based brazing materials when brazing. In general, copper can cope with gaps of <math><0.075\text{mm}</math> but gaps in excess of this can lead to a breakdown of the braze flow. Copper can also cope with a light interference fit which is extremely useful as this can aid with location of the mating parts, however, the nickel based brazing materials usually require a small clearance fit. It is always best to seek advice on this point.

Whenever possible, mating parts should be self-supporting or self-jigging as jigs inside the furnace can add significantly to the unit price and they may move during the process leading to scrap parts.

### Joint Strength

Correctly designed and brazed joints should produce a strength that is in excess of the parent metal. A trap many people fall into is to have too long a joint. This can prove to be difficult to fill and can lead to voids in the joint. An example would be tubular assemblies. The joint lengths should be approx  $4 - 5 \times T$  (where "T" is the wall thickness of the tube) longer than this can lead to a weaker joint. This ruling also applies to the brackets. In some cases, the brackets wrap half way round the tube making it very difficult to completely fill the joint.

### Surface Condition

Components should be clean, dry, oil free and free from swarf and rust before brazing.

It should be noted that score marks, shot blasted or roughened areas in



the region of the brazed joint can attract the braze away from the joint. Fine threads close to the joint are also very attractive to the braze.

### Post Braze Processes

Due to the high melting point of the braze material [ $1083^\circ\text{C}$  for Copper] most commonly used hardening and case hardening heat treatments can be carried out after brazing. Also most plating processes take well on copper brazed components.

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## Main Advantages of Furnace Brazing

- A uniformed heating and cooling rate can reduce the potential for distortion.
- Joint strengths greater than the parent metal are possible.
- Parent metals are not fused or damaged.
- Stresses are relieved during brazing.
- No surface deterioration takes place during the process.
- Dissimilar metals can be brazed together.
- Different metal thickness are permissible in brazed joints.
- Multiple joints can be brazed at the same time.

- Furnace brazing facilitates the manufacture of complex and delicate assemblies which might not be possible to achieve by any other method.
- Rapid reproducible results are obtainable.

## Disadvantages of Furnace Brazing

- Close fits are necessary to facilitate the capillary action.
- Component parts will be annealed during the process.
- Provision for location of the brazing material has to be allowed for in the design.



**Furnace Brazing Is Also Commonly Referred To As:**  
Copper Brazing,  
Bright Brazing,  
Mesh Belt Brazing and Atmosphere Brazing.



## Heat Treatment

Heat Treatment has long been recognised as one of the essential weapons in the metallurgist's armoury and is capable of radically changing the structure of metal. It is used either to prepare a material for further processing (machining, forging, pressing, spinning, etc) or to add a property such as surface hardness to improve a product's performance in service.

Kepston's quality-accredited subcontract heat treatment service is a major benefit to any manufacturer looking for a particular thermal process but lacking the specialist equipment themselves.

### Heat Treatment Processes Available:

- Ageing
- Annealing
- Furnace Brazing
- Hydrogen De-embrittlement
- Magnetic Annealing
- Normalising
- Precipitation Hardening
- Stainless Steel Brazing and Annealing
- Stress Relieving
- Tempering

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## Bright Annealing

The primary purpose of bright annealing is to reduce the hardness of a material in order to facilitate the progress of subsequent manufacturing operations. Annealing is commonly used to soften materials, minimise residual stresses, improve machinability and increase ductility. Some materials require only minutes at temperature whilst others can require prolonged soak times with slow, controlled cooling rates from the annealing temperature.

Solution annealing is the term that is commonly applied to austenitic stainless steels and is typically carried out between 1010°C and 1150°C. With unstabilised grades, the cooling rate must be relatively fast, otherwise carbide precipitation can occur. This can then lead to poor corrosion resistance but with the low carbon grades and the stabilised grades, the cooling rates are less critical. Annealing is also used to demagnetise certain stainless steels after the material has been work hardened.

Stress relieving, normalising and annealing all prepare metals for further processing or for the intended service conditions. They control the ability of materials to be machined with ease, perform without distortion in service, be formed without cracking or splitting, be sub-

sequently hardened or carburised with minimal distortion or to resist corrosive environments. Stress relieving of carbon or low-alloy steel is frequently the last heat treatment applied and therefore it must be ensured that the mechanical properties of the materials treated will not be adversely affected. Stress relieving between machining operations can be performed on pre-treated material, however, care needs to be taken so ensure the existing mechanical properties are not affected.

Please note that there is always the risk of distortion/sagging when high-temperature treatments are applied to vulnerable thin-walled parts or large, heavy components.

Kepston operate both batch and continuous furnaces with protective atmosphere. This means materials such as stainless steel, steel and copper, are all clean and bright after annealing. Brass however will discolour due to the zinc content. Kepston can process steel and copper bar and strip <5 metres in length. On stainless steel, we can anneal up to 3 metres in length, depending on the diameter.

Parts for annealing should be clean, dry and oil free, otherwise the furnace atmosphere can become contaminated which is not only detrimental to the surface finish of the



components but can also cause damage to the furnace itself.

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## Magnetic Annealing

The aim of the process is the recrystallisation of the material and removal of any trace of work hardening. It should be carried out in a



contamination free and preferably "reducing" furnace atmosphere. Most material manufacturers state hydrogen is the best atmosphere for magnetic annealing as it is both decarburising and strongly reducing, both of which are beneficial for maximum soft magnetic properties. Control of the soak temperature, soak time, cooling rate and furnace atmosphere is essential for the realisation of the optimum soft magnetic properties. Parts must be clean, dry and oil free before an-

nealing. Traces of oil/grease can burn into the surface and can reduce the effectiveness of the process. Principal components include: relay and solenoid parts such as cores, yokes and armatures, magnetic shielding, magnetic cores, sensors, cores and laminations for high performance motors. Basically any component requiring high permeability or low coercivity.

Materials are often referred to by their trade names but come under the category of: nickel irons, cobalt irons, soft irons, silicon irons and very low carbon steels. With a moist hydrogen atmosphere, even low carbon steel can see some benefit from the process though the improvements would be limited. Once components are magnetically annealed, great care should be taken to avoid shock, damage or the introduction of work hardening as

the magnetic properties will be impaired.

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## Wire Erosion

WEDM wire cutting uses a wire electrode, generally brass, to cut a programmed contour into a work piece. Press tools and extrusion dies are common applications to utilise this process. The wire can be programmed to be inclined to erode taper parts; this process can be used to produce different shaped parts either end of the taper.

The wire never actually makes contact with the work piece, the electric spark from the wire produces intense heat melting the metal as it contours. The WEDM spark always takes place whilst the work piece is submerged in deionised water. The conductivity of the water is carefully controlled to aid the discharge process; the water also acts as a coolant and a flush to remove metal particles.

The work piece will require a start hole or the profile can start from an edge. The wire erosion process can have numerous cuts, most parts are roughed out and then a trim or multiple trim cuts applied.

Here at Kepston, we use an Agie V4 machine this gives us total axis ca-

capacity of 1300mm in X 1000mm in Y and 520mm under the head.

It also gives us the capacity to machine with up to 5 trim cuts.

### Advantages of wire erosion at Kepston

- Low work holding forces required
- No tool wear (new wire is constantly fed from spools)
- Hard material can be machined easy
- Complex shapes cut with the aid of off line CAD programming
- Very accurate +/-0.002mm
- Capacity of X 1300mm , Y 1000mm , Z 520mm
- Multiple stacked sheets can be wired at the same time.

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## C.N.C. Jig Grinding

A C.N.C jig grinder is a very accurate machine tool for grinding complex shapes and holes where the highest degrees of accuracy and finish are required.

The jig grinders operate by air/electric high speed motors on a rotating spindle. The speeds from the interchangeable motors vary from 6000rpm to 175000rpm. The machines run on very accurately prepared x and y table beds with the addition of a spindle c-axis. The C.N.C jig grinder can be programmable with all three axes in motion at once; this gives the machine the ability to accurately profile to tolerances of .001mm.



The latest C.N.C jig grinders give you the ability to programme and grind using up to 5 axis movements at any one time.

Here at Kepston we have 5 C.N.C jig grinders with the next addition arriving in February 2014

- Moore CP1200
- Moore G48
- Moore CP450
- Moore G18 retrofit
- Hauser S35-400
- **NEW ADDITION FEB 2014 – Hauser H35-400**

The Moore CP1200 gives Kepston the largest jig grinding capacity in the UK.

The machine was supplied with an additional 150mm of work head height over the existing standard machine. We realised that there is a growing market for high precision large component grinding. Kepston invested and took delivery of the Moore CP1200 in February 2013.

The Hauser H35-400, the new addition due for delivery in February 2014, will propel Kepston to the forefront of C.N.C jig grinding in the

UK for years to come.

The Hauser H35-400 will provide an unparalleled variety of grinding strategies with its z, c and u axis configurations and automatic taper grinding with z-u axis interpolation. We have commissioned Hauser to provide additional work on the slide ways to effectively blue print the machine for greater profile accuracy.

**“New  
Addition Feb  
2014—Hauser  
H35-400”**



## C.N.C Universal Grinding

A C.N.C universal grinder is a grinding machine to external/internal grind a work piece.

The work piece is held horizontally such as in a lathe, the work piece constantly rotates along with a grinding wheel on either a work head or internal spindle. The bed of the machine is traversed with an in feed from the work head the component is ground.

Kepston currently have two Kellenberger Kel-Viva C.N.C universal grinders.

These machines have the latest hydrostatic guides for accurate z

axis slide movement and x axis in feed. The machines have 2 wheel head options with B and C axis along with (KEL-SET) for automatic grinding wheel measurement.

The C axis provides the option to grind unround parts such as polygon forms.

They have the capacity to grind 1000mm x 350mm Dia, max weight of work piece 100 kg.



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# Social News

## Brent Millage #54 Caterham Racing.

As the end of 2012 approached a major decision was required, two wheels or four!!! After four happy years competing on two wheels with varying levels of success (2011 was the best, five podiums and fourth in the championship) it was time to think again. The older you get the more it hurts when you have the unfortunate situation of sliding up the road on various parts of your anatomy!! It also takes longer to recover. At the young age of 54 it was time to either fit stabilizers to the bike or invest in a vehicle with four wheels in the first place.

After much consideration and with a heavy heart, based on missing a number of good friends in the bike paddock, it was decided to go with the four wheels. This was a cause of great relief for my colleagues, not so sure about my wife as she had the insurance claim forms ready during each race weekend!

The mode of transport was selected, a Caterham Tracksport. The year has been a steep learning curve. There have been mixed results but a good start. The only issue was the lack of performance after the 1000cc race bike. As I am a fairly large person I have already made the decision to move up to the R300 spec car for 2014. Having tried the car for the last couple of race meetings in 2013, it has proved to be the right decision. The car is currently being prepared and painted into the company colours.



Zandvoort Circuit—Holland 2013



Zandvoort Circuit—Holland 2013

I can not wait for next season to see what I can do, I believe the racing will be covered on Motors TV next year, so if you fancy some “light entertainment” or a laugh please feel free to watch, or if you have the time you would be most welcome to visit one of the rounds, when the dates are published. I will keep you posted on the progress in the next newsletter.

## Paul Oakley

“It is with great sadness that I write to inform you of the passing of Paul Oakley (Son of Andy and Annette Oakley). Paul was 22 years of age and had been fighting cancer for the past two years.

Paul was such a popular young man who made his mark in the Royal Navy as well as with everyone with whom he came into contact. His positive approach to life never left him and was infectious. He achieved such a lot in his tragically short life, not least of which was the remarkable sum of money he raised for the two charities he was very close to:- Royal Centre for Defence Medicine Welfare Fund and Teenage Cancer Trust.

He had raised £5,530 at the time of his death and that figure continues to grow week by week, a further £2,260 was raised through donations at the funeral itself.

I would like to take this opportunity, on the Family’s behalf, to thank friends, colleagues, customers and suppliers for their support during this difficult time. The number of messages of sympathy and support underline the warmth and respect in which Paul and his Family are held.”

