



ORACLE

Journal of the Institute of Sheet Metal Engineering



**MPPS continues to
invest in new
equipment**

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**AP&T delivers world's
first in Aluminium
hot forming**

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**Bruderer unveils
UK first at
MACH 2016**

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Cover picture - Bruderer’s UK MD Adrian Haller and Sertec Birmingham’s Operations Manager Martin Hinkley check over a tool in a new 800 Tonne Zani Press.

A full report on Sertec’s huge press shop investment will appear in the next issue of The Oracle.

The Oracle, mouthpiece of the Institute, speaks for and to the world of Sheet Metal Forming & Pressworking by way of featuring News, Views and Topics around the Industry



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From the President

Dear ISME member,

A real "Curate's Egg" mixture of observations on the Sheet Metal business climate come to mind as I write this, good in parts, not so good in others. From the perspective of our own business and many of our customers and suppliers, it seems that the domestic uncertainty brought about as we wait for the EU Referendum is suppressing confidence levels somewhat, at a time when global trade is also in a downturn. The future of the Tata steel plant at Port Talbot hangs in the balance as I write, an episode which unfortunately only highlights the extent to which our politicians have consistently failed to understand the needs of our Industry.

On a brighter note it is very encouraging to see the new investment being made by ISME Members, as reported in these pages, which as always contain technical articles we hope will be of interest to members.

For those Company members with an interest in moving their business technologies forward (all of us I Hope), I strongly recommend opening a dialogue with our local Catapult Centre, the MTC at Ansty, Coventry. Whilst metal forming technology is not the main speciality at MTC, there are plenty of other relevant activities to interest enquiring engineering minds, not least in the areas Additive Manufacturing and Virtual Reality for process layout planning. For those interested, a useful contact is Stefan March, MOE Business Development Manager, contact email - stefan.march@the-mtc.org

Alan Shaw

ISME President



ISME Honorary Secretary's Report



I'm pleased to report on a positive few months for the Institute. You will read elsewhere of the successful Thinktank event in February and tickets for the AGM and Gold Medal Dinner in May are selling well. The iconic venue of the RAF Museum Cosford has already attracted several entries for the Skills Competition in June.

Talking to member companies most are still busy and investing in new equipment although the discontinuation of the Land Rover Discovery model has caused a few problems.

We would like to feature more stories about members and their companies. If you have a good news story about investment, people or large contracts you would like mentioning in Oracle, please let me know. We are always looking for interesting works visits. If you would like to host a tour of your company, again get in touch.

I am pleased to welcome five new members to the Institute:

Barry Yeomans, Wheaton Aston.

Barry will be well known to many members as Past President of the CBM and former director of Hadley Industries. Barry brings a wealth of experience to the Institute.

Wayne McIntosh, Burnley

Wayne is a Lecturer in Engineering at Burnley College. Before taking this position he gained extensive experience in sheet metal working and welding. He has agreed to help with judging at this years Skills Competition and hopefully will bring some students with him.

Adam Desmier, Halifax

Adam is Operations Manager at Wm Spence (Sheet Metal) Ltd, Bradford. He started his career as an apprentice sheet metal engineer and as had experience in CAD, project engineering, estimation, supervision and management.

Christopher Wright Wilmslow

Chris is a Teacher of Engineering at Isle of Wight College. He has extensive experience in the sheet metal field with particular skills in welding technology.

Mike Burton, Birmingham.

Mike is Operations Manager at ISME Company Member Orthinghaus UK Ltd. He has an Engineering degree from Birmingham University and before joining Orthinghaus gained extensive and varied industrial experience in Quality, Project Management, Applications Engineering, Technical Sales and Marketing. He is also a qualified commercial pilot.



Mike receiving his ISME Membership Certificate from ISME Hon. Sec. Bill Pinfold.

We must congratulate our member Balaji Llangovan on being awarded a PhD for his work in Automated Panel Forming. Some members will remember visiting the EPSRC Centre for Innovative Manufacturing in Intelligent Automation at Loughborough University and seeing his robotic panel former. A video of the process can be seen on the link below: <https://youtu.be/FQ5yPOJ2USc>

As part of his research Bala spent 3 months working as a panel beater to help his understanding of metal forming. We wish him well in his career.

Bill Pinfold - March 2016



Notice of the Institute of Sheet Metal Engineering 2016 AGM & Gold Medal Dinner

71st Annual General Meeting

of the Institute of Sheet Metal Engineering
held at

Wolverhampton Wanderers F.C.

Molineux Stadium, Executive Club, Waterloo Road, Wolverhampton WV1 4DR

Thursday 12th May 2016 (reception 6.30pm, AGM 6.45pm prompt)

*Copies of the agenda and Minutes of last year's meeting can be obtained
from the Honorary Secretary via email at ismesec@gmail.com*

Followed by

Gold Medal Presentation Dinner

The Gold Medal will this year be presented to

Ian Harnett – Jaguar Land Rover Head of Global Purchasing

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2015 Gold Medal Winner Rachel Eade MBE

to speak about the UK Automotive Supply Chain

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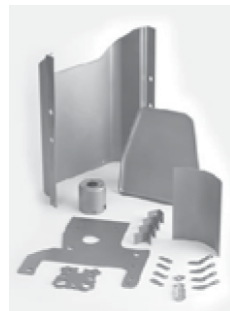
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ISME Member MPPS Ltd. Invests in New Equipment



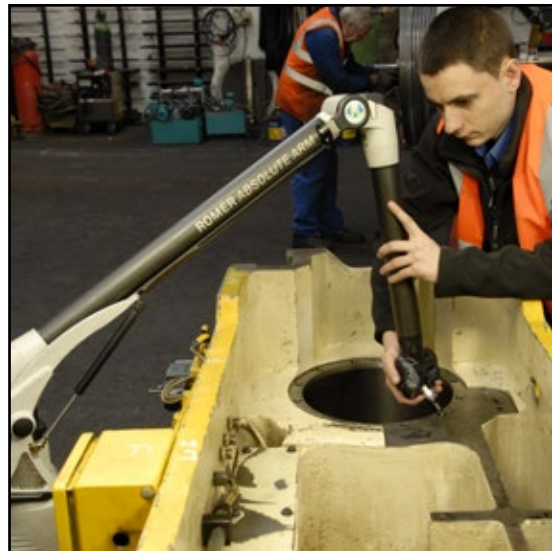
After upgrading its CAD solid modelling design systems, MPPS has invested in a ROMER Absolute Arm – portable coordinate measuring machine and DeziqWorks software. This means that given only a worn or broken part or assembly MPPS can 'reverse engineer' components and assemblies without access to original design documentation. In addition to supplying spare parts MPPS will use these systems when refurbishing and/or modifying customers' existing machinery. The ROMER CMM will also be used for inspection of large new or modified items prior to final assembly.

As part of the continued investment in production capacity MPPS has recently installed Two CNC Bed Milling Machines

They are Sachman CNC Bed Millers with bed size 2700mm x 730mm capable of handling components up to 4000kg – machine traverses X= 2200mm; Y=800mm, Z=950mm.

A Dugard Eagle 1000 CNC Vertical Machining Centre has also been purchased.

The addition of these machines enables MPPS to produce components more quickly thus contributing to reduced lead times on critical spare parts and re-machined components.



The Davey Udal Award



This is an occasional award for services to the Sheet Metal Industry. Previous winners include Phil Hadley. At this year's AGM and Dinner the award will be made to Professor Jianguo Lin for his major contributions to technical developments in the sheet metal industry.

Professor Lin is an ISME Member and served on the ISME Council for many years before moving to Imperial College.

Professor Jianguo Lin Biography

Professor Jianguo Lin holds the TATA Steel/ Royal Academy of Engineering Research Chair at Imperial College London. He is a Fellow of the Royal Academy of Engineering and has authored and co-authored over 200 scientific publications and written the book "Fundamentals of Materials Modelling for Metals Processing Technologies".

Professor Lin researches in the fields of metal forming, computational mechanics, materials modelling and materials testing. He is responsible for the development of the new HFQ® sheet Aluminium forming process and is a founder Director of Impression Technologies

Ltd, a spin-out company from Imperial focussed to commercialise the HFQ® process and which will open its new £6m manufacturing site in Coventry in 2016.

At Imperial College Professor Lin is head of the Mechanics of Materials Division, where he has led the formation of several prestigious research centres. He is the Director of AVIC Centre for structural design and manufacture; Director of AVIC Centre for materials characterisation, processing and modelling and Director of Sifang–Imperial Joint Research Centre for Rail Transportation Manufacturing Technologies.

Jianguo's UK research career started in Sheffield in the early 90's where he studied the mechanics of leather for shoe making under the supervision of Professor David Haeyhurst.

At the University of Manchester Institute of Science and Technology he worked on characterisation and modelling of high temperature creep and fatigue in metals.

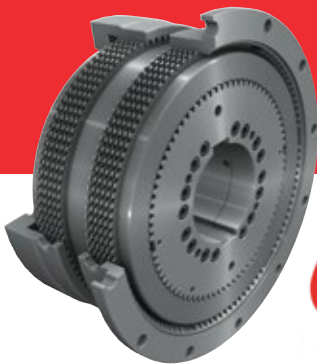
Jianguo joined the Geometric Modelling Group at The University of Birmingham in 1996 and took leadership of the Metal Forming Group in 2002. His previous experience enabled work on hot sheet forming to be established. His rising fame led him to be called on as consultant by companies, home and abroad.

In his new role he won prestigious EU funding and published key papers on phenomenological modelling, test methods and new forging and forming technologies. In 2008 he was offered a chair at Imperial College London.

Since joining Imperial College, Jianguo has established himself as a leading world

expert in the modelling of high-temperature plasticity in metallic materials. Material models developed within his group have been used in many companies for predicting microstructure evolution and material properties in hot/warm metal forming processes such as Aisin Tokoka (Japan), Israel Aircraft Industry (IAI), AIRBUS, CORUS (UK) Ltd, Rolls-Royce, and others.

He continues to lead international research projects with a combined budget of over £10 million and has made significant contributions to hot sheet metal forming technologies such as hot stamping of boron steel and hot sheet aluminium forming. Jianguo has supervised over 25 PhD students, thereby imparting his expertise to the next generation of leading academics, industrialists and metal forming experts.



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ISME at Thinktank “Meet the Experts Day” February 2016

Each half term the Thinktank in the Birmingham Museum, Millennium point hold a Meet the Experts Day where large companies and Institutions are invited to put on an exhibition with an intent to engage young people into engineering and in STEM subjects generally. The format is for engineers to show various aspects of engineering basically from their own work experience. This is often in the form of interactive activities. Companies are encouraged to bring along various examples of engineering parts and be prepared to talk about these and how they are used within their industry. Parts which the children can “play” with – dismantle – build – explore – etc. are particularly welcome.

ISME were represented by Sertec, Radshape, Black Country Manufacturing, Bruderer, LEMA and model maker and engineer Alec James.

On the Sertec stand toolmaker apprentices Sean Rhodes and Gareth Hoskins showed their work pieces from last year’s ISME Skills Competition and talked to the visitors about the opportunities in engineering sharing their own experiences as apprentice toolmakers.

Radshape showed the construction of a stainless steel radiator grill for the Bentley Mulsanne with the young people able to have a go at assembling the components. People were surprised and pleased that parts for the Bentley car were produced nearby in Birmingham. There was also a plastic grill on the stand as used in on the “cheaper” Bentleys and we were able to talk about the selection of materials. Thanks to Regent Engineering for supplying the plastic grill.

Bruderer showed a number of pressings and interesting applications including drinks can tops and sauce bottle tops.

Black Country Manufacturing showed a picture of Dark Vader produced on one of their turret presses whilst LEMA gave details of training opportunities for young people.

ISME’s good friend, Alec James again showed some of the excellent models he has built including a radial engine and a Congreve Ball clock. Watching the rolling ball fascinated children and parents alike.

The Thinktank is always busy at half term but the very wet weather meant attendance was around 2,200 so the stands were very busy.

The Institute was well supported on the day by John B Davis, Adrian Nicklin, Bill Pinfold and Mark Whitcombe from MPPS and our thanks also go to Steve Morley of Sertec, Keith Chadwick of Radshape and Adrian Haller for supplying the stands and letting there staff take part.

A long day but very rewarding and hopefully we will do it again next year with an even bigger and better display.





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AP&T delivers the world's first production line for hot forming of Aluminium with HFQ®

HFQ® is a new technology which enables parts to be manufactured that have low weight, high strength, complex shapes and high dimensional stability in one single step. CIPCO, a 100% subsidiary of Impression Technologies Ltd (ITL), is the purchaser.

The new method, the Solution Heat treatment, Forming and in-die Quenching process (HFQ®), was developed at the Universities of Imperial College London (ICL) and Birmingham (UK) and is now being industrialised in LoCoLite, an EU FP7 project.

AP&T collaborates in the project together with several stakeholders (including ITL and PAB) from European industry and academia to produce solutions that can help car manufacturers reduce vehicle weight, energy consumption and impact on the environment. The first prototypes produced using the new method have been demonstrated in the LoCoLite project, and in early 2016 it will install the first production line.

“The new process allows high strength aluminium alloys to be formed into complex geometries through the increased formability, with sharper bend radii and almost total elimination of spring-back. These are significant advantages compared to traditional stamping processes. These qualities are of major interest for the automotive industry, and they give the

technology a large potential market,” says Dr. Christian Koroschetz, Director Technology Development at AP&T.

The new production line will be used by CIPCO to manufacture lightweight parts for several British car manufacturers, as well as for continued development work of the HFQ® process. “In just a short amount of time, we have taken a new and promising technology from concept to functioning production solution. Cooperation with ITL on HFQ® began in 2012. LoCoLite was launched the year after, and we have now delivered the first order. This is a major and important step,” says Peter Karlsson at AP&T, responsible for the company's contacts with LoCoLite.

George Adam, CEO of ITL said “We are pleased to be working with AP&T and taking delivery of this world leading equipment for our HFQ® facility in the UK.”



CIPCO is the result of a collaboration between PAB Coventry and Impression Technologies Ltd and is backed by the UK government's Advanced Manufacturing Supply Chain Initiative.

The production line for HFQ® includes, amongst other things, a 6000 kN high-speed, hot forming press, AP&T's Multilayer Feeder Furnace, SpeedFeeders and a process and thermal monitoring system.

HFQ is a registered trademark of Impression Technologies Ltd.

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Fundamentals of Materials Modelling for Metals Processing Technologies

Theories and applications

By Prof. Jianguo Lin, Imperial College Press, 2015

The last years have seen a significant number of books in materials processing that result from the summation of individual contributions of leading international experts. These books are intended to provide the most recent advances in specific fields of scientific knowledge and technology to engineers and researchers but are often not appropriate to young students. This is because, these books do not have a bottom-up approach presentation of knowledge and their style frequently suffers from lack of consistency in terminology and notation throughout the chapters.

The book by Prof. Jianguo Lin is a very good example of a well-structured book where young students, engineers and researchers are taken together in a journey that starts in the fundamentals of metal forming processes, plasticity and viscoplasticity theories, continuum damage mechanics and material science and ends in the concept of unified constitutive modelling methods for metal forming. Special attention is also paid to the relevant numerical methods that are needed to solve the constitutive equations and to determine their material constants from experimental data.

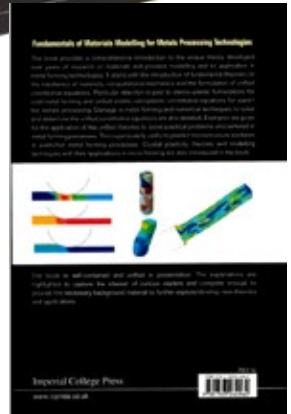
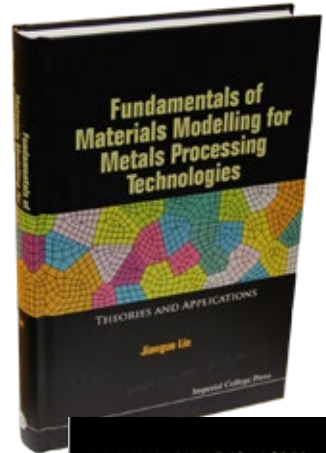
A chapter covering materials and processing modelling in selected metal forming applications provides the link between the concept of unified constitutive modelling and its utilization in commercial finite element programs. In fact, the overall structure of this chapter is a little bit wider because each selected application contains a short description of the process and of the associated finite element model.

The book ends with a comprehensive introduction to crystal plasticity, associated constitutive equations and modelling methods for those readers willing to extend their knowledge or their research activity into micro-forming.

Prof. Jianguo Lin wrote an important new book on metal forming that provides an innovative and integrated view of deformation mechanics, damage mechanics and microstructural material behavior. My only wish as a reviewer who had the privilege to explore this excellent book is the availability of a complementary book of exercises targeted to young students in the field.

Written by Professor Paulo A.F. Martins

(Professor of Manufacturing at Instituto Superior Tecnico, University of Lisbon)



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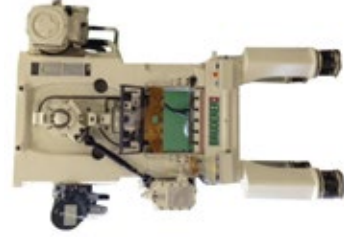
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Bruderer unveils 'UK' first at MACH 2016



Bruderer UK has celebrated its biggest ever presence at MACH by unveiling a 'UK' first in high performance stamping.

The company, which has bases in Birmingham and Luton, showcased its BSTA 410-110 for the first time ever in this country, a new high speed press that meets growing customer demand for greater production complexity.

Combining the dynamics of its well-proven BSTA 280 with the performance of a BSTA 510, the new machine boasts a stroke speed of 1600 per minute and an impressive tool loading area of 1100 mm.

Bosses at the firm have already received significant interest for this new technology, with clients involved in construction, food, micro electronics and medical all visiting the stands during the show.

"MACH is a major event in our calendar and we always like to be able to launch something new to the market...this year was no different," explained Adrian Haller, Managing Director of Bruderer UK.

"There has been a lot of interest in the 40 tonne range and the BSTA 410-110 addresses this demand, offering speed, precision and extra bed length capacity. It's an irresistible combination, especially when you add in the latest high speed precision servo feeder technology we can provide."

He went on to add: "Priced at approximately £350,000 it represents great value for money and we expect to sell at least three of these machines in the UK this year.

"There were live demonstrations of the high speed press during the big unveil on Tuesday, featuring tooling from precision component manufacturer Fibro."

Bruderer had a major presence in the Metalworking Village at MACH and, in addition to the BSTA 410-110, promoted its collaboration with ZANI presses, which sees it provide presses from 200 tonne to 1000 tonne, together with service and parts support for the UK and Ireland.

A number of interesting working displays were

exhibited, including innovations for shop floor data collection to support overall equipment effectiveness (OEE), press and press tool protection systems and a section on Biegema, formally known as Finzer and a specialist in bending and forming of complicated parts.

There were also the latest developments in lubrication systems, mould tool rotators, test machines, laser and inkjet systems, not to mention a host of coil handling and servo feeding solutions, together with state-of-the-art welding of virgin and stamped strip.

Adrian continued: "We had experts from all areas of the business on hand to meet with delegates and discuss their high-speed press and press shop requirements.

"We received even more interest than last time and expect to sell more than £1m of machines as a result of our appearance at MACH."

Bruderer UK enjoyed significant growth in 2015, seeing sales pass the £3.5m mark with the potential to increase even further over the next twelve months.

The Swiss-owned company, who manufactures presses ranging from 180 up to 2500 kN, boasts a total of 11 divisions with six competence centers across the world.

For further information, please visit www.bruderer.co.uk or follow @brudereruk on twitter.



Why choose engineering?

ISME contacted several of our members to encourage trainees to write a few words on why they chose engineering, what were their training experiences and what might their career aspirations be.



Gareth Huskins - Sertec

I'm a second year Maintenance Apprentice for Sertec Group Holdings Limited.

My job might consist of anything from topping up oil or changing a fly wheel on an 800 tonne press. I thoroughly enjoy what I do and working really hard.

I was at college for the first year full time doing my BTEC level 3 and NVQ level 2 in Engineering. Now I study one day a week and spend the remainder of the week at work. I highly recommend Sertec and Engineering as a career.

Mark Whitcombe - MPPS

I choose an engineering based career as I have always been interested in how things work and the reason behind why something is like what it is.

Following this interest, my first experience of engineering was during my last years of school where I took a BTEC in engineering at Dudley College. It was here I first used a CAD programme and realised that I would like a career in which I used CAD software.

I then went on to study A Levels in the core subjects of Engineering Maths and Physics. From this I was able to go on and study for a degree in Mechanical Engineering at the University of Wolverhampton, where I further developed my knowledge and skills, enabling me to take a placement year out of study to work at Midland Power Press Services.

Whilst working I have further developed my knowledge and skills in engineering, particularly learning to reverse engineer with a Romer Arm and CAD software. From here on, I have decided to continue working with MPPS whilst continuing to finish my degree part time. My current future career aspirations are to complete my degree and to continue to develop as an engineer at MPPS.



Sean Rhodes - Sertec

I was fortunate enough to be selected for the role of a Technical Apprentice at Sertec and I can already envisage a bright future within the company.

The opportunities I have been provided with range from gaining experience in the company's Tool Room where I contribute first hand in the production of parts, to gaining highly regarded qualifications within engineering.

This will allow me to achieve my overall goal which is to continue to climb the ladder at this company and take advantage of all the opportunities



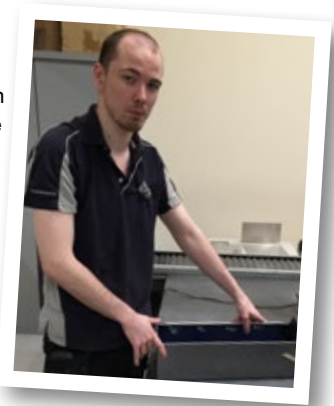
Matt Martyn - PAB

I am currently an Engineering Apprentice at PAB Coventry. The reason I decided to choose a career path in engineering was because I have always had an interest in the way things work and how they are built.

Understanding the processes is greatly rewarding and having the ability to actually get "hands on" was extremely positive for me.

This has given me a sense of pride, knowing I have created a job and the customer is happy. The knowledge I've gained during my training has been vast and the company has stood behind me 100%.

My expectations are to become a fully skilled worker in my area and potentially in the future a Manager.



Apprentices past and present - James Spalding , Jack Higgins, Kenan Wilks, Jamie Sproson , Keith Chadwick (MD) Tom Gwynn, Dylan O'Rourke, Richard Massey

Missing from Line Up (on Holiday): Conor O'Rourke, Ricki Burmi & Joel Wilks

Radshape Apprenticeship Programme

- Over 10 Year's Radshape has offered Apprenticeships to 10 young people
 - 9 are still with the Company
 - 3 Apprentices have progressed to Staff positions as CAD & Commercial Engineers
 - Over a number of years the Apprentices have won many awards at the ISME Skills Competition
 - As well as winning the ISME award Jack Higgins won the UK Skills Competition and only just missed out on representing the UK in the World's Skill Competition
- Why an apprenticeship?**
- Comments received from Staff regarding as to why they undertook the role of an Apprenticeship were as follows:
- Being paid whilst learning and no tuition fees or student loans etc.
 - Learning theory side of processes is ok, but 'hands on' experience allows extra knowledge to be applied to the situation with guidance and support, to provide a better outcome which could not be learned from a text book.
 - A good way to get in to work and start career
 - Acquire recognised qualifications for your industry/workplace.
 - Apprenticeships offer great opportunities and secure a future with the company/trade chosen.
 - A pathway to enjoy what interests you and gives you something to aim for and specialise in, which in turn can open up many pathways for a career to follow.

HARWIN – investing in machinery to stay at the cutting edge of technology.

With half a billion stampings a year, HARWIN need to keep their finger on the pulse of the best that research and development has to offer. And with BRUDERER, they have found the ideal partner to support the company as it grows and adapts to the needs of expanding and ever more demanding markets.

British company HARWIN was founded in 1952 by Patrick de Laszlo, a visionary who believed that components should be engineered to the highest possible standards. That goal is still very relevant today and it is why they invest heavily in keeping their plant and machinery ahead of the game in terms of technology.

HARWIN manufactures surface-mounted printed circuit board (SMT PCB) hardware, high-reliability interconnects for a wide range of safety critical applications, and industry-standard connectors. The company's sales and service offer extends around the world via offices and manufacturing facilities in the UK, USA, Germany, France and Singapore, coupled with a worldwide distribution network.

Harwin has 200 employees, 140 of them based in Portsmouth with many working on stamping the EZBoardWare range of SMT PCB hardware products that improve assembly processes and reduce customer installed costs, as well as components for their highreliability connector families Datamate and Gecko.

They also have an apprentice scheme to ensure that they always have the necessary skills to run the newest engineering and plating technology along with the design and tool-making skills necessary to manufacture products right from the raw materials. This avoids out-sourcing from supposed low-cost countries, which in turn reduces the time to market and increases the flexibility of the services offered to customers.

BRUDERER world-first

HARWIN is a vertically-integrated company which retains all manufacturing processes in-house and systematically puts 10 % of turnover back into the business. They invest heavily each year to keep their manufacturing capability abreast with the latest technology, replacing machinery on a five-year cycle throughout the manufacturing process.

A perfect example of this is the recent £500,000 investment in a BRUDERER highperformance automatic stamping press at its Portsmouth plant, to help it increase efficiency and conquer new market opportunities in the aerospace, military and medical sectors. The purchase of a brand new BSTA 280 -75, with a BSV 75 highspeed servo feeder, further strengthens the company's 30-year relationship with the Swiss-based company in high-speed stamping technology. It has also created a world first, with the integration of a BRUDERER BPG 22 planetary gearbox into the shaft of the main motor which gives HARWIN's engineers full control of tooling development to produce test runs of new products.

The press works with 28 tonnes at from 1 up to 2,000 strokes per minute. Strips range from 0.01 millimetres to 3 millimetres in thickness and widths of 3 millimetres to 100 millimetres, and are produced in brass, stainless steel, foil, phosphor bronze and beryllium copper, to a tolerance of 0.001 millimetres. Tooling can be designed in either single or multi-stampings to increase capacity, while automated de-reeling and re-reeling also allows HARWIN to manufacture around the clock.

Increased efficiency, reduced costs and streamlined logistics.

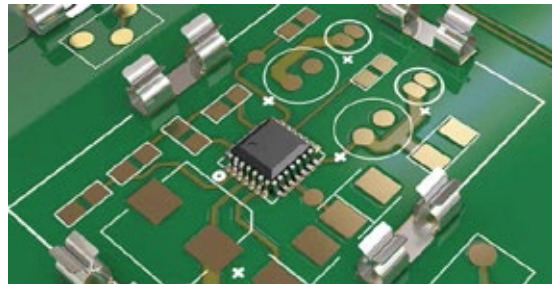
"BRUDERER has supported HARWIN in our

vision of automation and offered a high level of technical support,” explains Operations Director Richard Wild. “Throughout the HARWIN organisation there is a high level of confidence in BRUDERER’s service and ability. The BSTA 280 -75 with the high-speed servo feeder and planetary gearbox basically removes the need for a separate development press, as we can put new tools through at the lowest stroke rate and at full press capacity, allowing us to identify any issues before flicking a switch to launch full production. There are lots of advantages to this: increased efficiency reduced costs, less space required and even gains in terms of logistics, since tools now require less transport. We are continually investing in our new product development programme and this new acquisition will help us develop the next generation of connectors, EZ boardware, interconnectors, circular connects, spacers and terminals.”

Ben Green, Technical and Marketing Communications Manager for HARWIN, underlines how the investment will help to strengthen the company’s commitment towards being at the cutting edge of research and development. “A large part of our focus is on constantly developing high-reliability components that go into ground-breaking applications such as nano-satellites, blood gas measurement sensors and even the NASA Robonaut humanoid robotic development project which featured our off-the-shelf expertise,” he explains. “This BRUDERER machine gives us the capability to continue to lead from the front, not to mention providing a host of efficiency and cost savings. We are now in a perfect position to supply our customer base of 40,000 clients across the world.”

“One of our most exciting projects ever”

HARWIN’s order was secured by BRUDERER’s UK operation, which employs 11 people at its technical and sales office in Luton, just north of London. It has been working with HARWIN for over three decades and held a number of discussions with the manufacturing team



in 2013 to develop this innovative solution with the high-speed press, servo feeder and planetary gearbox which was unveiled in April at MACH 2014 – Britain’s largest exhibition of manufacturing technologies.

“This is one of the most exciting projects we have ever undertaken, and we’re delighted to bring a world first in machine technology to the UK which will help a forward-looking manufacturer like HARWIN to expand and create jobs,” explained Adrian Haller, Managing Director at BRUDERER UK.

“BRUDERER listened to what we wanted, and by working with their experts, we came up with a solution that met our exact requirements. We will benefit from a high-speed press that offers us great versatility by catering both for the development of new tools and for full production,” states Damon De Laszlo, Chairman at Harwin PLC.

In the years to come, HARWIN envisages stampings becoming ever smaller, in line with the general trend in electronics markets. Now more than ever, the company will be looking to leverage its engineering expertise and R&D to deliver customer value – hand-in-hand with BRUDERER.

Snippets From The MMMA

We are pleased to announce the appointment of our former Vice Chairman, Bill Neal to the position of Marketing Co-ordinator of the Association. Bill will take on the role of expanding and promoting the range of services provided to members leading to an anticipated growth in membership. In the first few months of tenure he has organised and overseen the creation of our entirely new website.

The Association has entered into an agreement with Agility an award winning organisation, established in 2004, having a strong geographic presence throughout the UK. Employing commercially aware innovative and experienced consultants offering HR Support, Employment Law Advice, Health & safety support training in a number of key areas suitable to the MMMA.

The package they are offering the MMMA is:-

Free HR / Employment law and Health & safety helpline service limited to 30 min advice on line, after which time the individual member can negotiate rates is required.

An option to provide additional consultancy support at discounted rates. Monthly Health & Safety and HR employment law newsletters

Invitations to their free HR/Employment law and Health & Safety seminars.

In addition to the above Agility will offer the MMMA the facility to bring members together for training courses, so as to maximise numbers and make the courses as cost efficient to members as possible. For example Health & Safety awareness course for ½ day at £495 subject to a discount for up to 20 people.

New Members

Press-Form Ltd

Distributors of Dimeco coil handling and process lines, ACF cornerforming machines, Sangiacomo presses and Haeger insert presses

Decade Monitoring Systems Ltd

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Cutting Metals With Knife Blades

– Cropping / Shearing

Cutting metal stock with knife blades, usually referred to as cropping or shearing is a simple, high productivity, low technology process. The sharp edges of the blades translate moderate machine force into very high local stress generating highly plastic zones emanating from the blade tips. This will lead to severance in ductile materials. In ductile-brittle materials the ductility is exhausted by the high plasticity, leading to crack formation and severance. If cracks progressing from the blade tips meet in the central portion of the stock 'clean' cut severance results and both plastic deformation and shearing force are minimised.

In cropping the blades penetrate the full width of the stock simultaneously. In shearing, the edge of at least one of the blades is set at an angle (the shear angle) to the long plane through the stock, so that only part of the cross section is loaded progressively across its width. The instantaneous load is lowered at the cost of an increased blade stroke.

The ductility /brittleness of the stock determine its behaviour during shearing or cropping and for metals this can be linked to its recrystallisation temperature relative to its temperature during cutting. Above their recrystallisation temperature metals are very ductile. At room temperature, lead is very ductile and steel behaves in a ductile-brittle manner, but above its recrystallisation temperature (~720 C), steel is very ductile and becomes more plastic as its

temperature increases. At high temperatures the behaviour of steel is similar to that of lead at room temperature. Following penetration of stock by the moving blade, the

longitudinal fibres suffer bending stress, enter the cutting gap between the blades, are stressed in tension and enter more extreme zones.

Severance occurs when resistance to deformation is exhausted, the fibres have both lengthened and thinned substantially and ductile rupture may finally occur. Only when the blade gap is more than about 5% of the stock thickness does it affect the hot shearing mechanism. In shearing metals at temperatures where they are ductile the loads are moderate but they tend to be prolonged particularly as blade gap is increased. Larger blade gaps result in more distorted cut edges, burrs and delayed severance. Changes in cutting speed have a small but significant effect on shearing stress and the work of cutting ductile materials; higher speeds reduce metal ductility. In cutting ductile metals increase in stock temperature and blade speed tends to improve cut appearance.

At room temperatures steels exhibit ductile-brittle properties. As the blades bite the stock the cutting force increases steeply with blade penetration in a roughly parabolic pattern to a maximum value. This peak value, often referred to as the shear strength of the stock, is usually

a fraction of the ultimate tensile strength; the cutting load then decreases sharply as the stock cross section area is reduced. At a certain depth of penetration, depending on the ductility and strain hardening characteristics of the stock, stress concentrations at the blades' tips create highly plastic zones. Strain hardening takes place in the plastic zones along a slip plane and where the ductility of the stock is exhausted cracks form, propagate causing ductile rupture and severance. For a given stock the stability and direction of travel of the advancing cracks are governed by blade clearance. Blade clearance is usually identified in terms of its fraction of stock thickness. When the cracks advancing from each blade tip meet exactly in the middle of the stock the period of high machine loading and the volume of material plastically worked is minimised and the degree of fracture in the cut surface is maximised.

The blade setting strategy most commonly adopted for shears is to approach as closely as possible this "ideal" blade set-up for the product mix processed. For most steel grades an initial clearance of 8% is a useful starting set-up when trying to determine the optimum blade clearance for the product mix. For structural

grades the optimum blade clearance has been found to be in the range 8% to 15%.

The cut surface appearance of severed stock provides an indication of how closely the set-up has approached the ideal, or how far it has deviated; with experience, operators will be able to assess whether a blade clearance has been much greater or much less than the ideal setting for the stock. Shavings accumulated in the shear bed may be indicative of tight gaps. Excessive blade clearance will result in a highly deformed cut area with some concealment or smearing of the fracture surface. Blunt blades produce diffuse shearing forces, tears, rough cut edges and cut surfaces may appear similar to those where the blade clearance has been excessive.

Good clamping of the stock and maintenance of blade sharpness will also minimise the duty on the components of the shear.

The peak shearing stress, or shear strength of the stock, is related to, and is a fraction of, its ultimate tensile strength (U.T.S.); it is a larger fraction for the softer grades of steel than for the harder grades. See below a table of data taken from Tselikov & Smirnov, (1931).

Steve Henderson

U.T.S. (kg/mm ²)	Specific Shear Strength (kg/mm ²)	Ratio "e"
101	61.8	0.61
67	46.3	0.69
43	38.7	0.90
18	28.4	1.58

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