METAL MATTERS

CBM
CONFEDERATION OF BRITISH METALFORMING

2022 - EDITION 62

ISSN 1759-5975 £7.50

CELEBRATING 60 YEARS 1960 - 2020

BROOKS FORGINGS

BRITISH MADE

FORGING, BENDING AND FABRICATION SERVICES

OVER 20 MANUFACTURING PROCESSES


Robot Forging


Upset Forging


Drop Forging


Counterblow Forging


Open Die Forging


Hand Forging


Hot & Cold Bending


Hot & Cold Pressing


Swaging & Pointing


Machining


Fabrication & Assembly


Flash Butt Welding


Forging Simulation

Quality Control


Warehousing

CERTIFIED LR ISO 9001 · CERTIFIED LR ISO 14001 · CERTIFIED LR ISO 45001 · EN 1090 & EN 15048 APPROVED CE · EN 1090 & EN 15048 APPROVED UKCA · NHS3 national highway sector schemes · RISQS RAILWAY INDUSTRY SUPPLIER QUALIFICATION SCHEME VERIFIED

tel. +44 (0)1384 563356 sales@brooksforgings.co.uk www.brooksforgings.co.uk

contents

Front cover image courtesy of Dreistern Automotive

up and coming events

Metallurgy for Non-Metallurgist: 15th & 16th March 2022, for further details please email melinda.jean@thecbm.co.uk

Regenerco Webinar – Wednesday 16th March, 2pm

CBM Sheet Metal/ Presswork Breakfast Sector Meeting: Thursday 17 March, 8.30 - 11.30am at the National Metalforming Centre, West Bromwich, B70 6PY Further details please email melinda.jean@thecbm.co.uk

MACH 2022: 4th -8th April at the NEC Birmingham

Altair Engineering - Forming simulation webinar with CBM, Tuesday 10th May at 2pm. For further details please email melinda.jean@thecbm.co.uk

Manufacturing & Engineering week: 6th- 10th June 2022 at the NEC Birmingham

Subcon: 7th-9th June at the NEC Birmingham

UK Metals Expo: 14th - 15th September at the NEC Birmingham

EUROFORGE: 28th - 29th September at Euskalduna Conference Center in Bilbao, Spain

Advanced Engineering 2022: 3-4 November NEC Birmingham.

Engineering Design Show 12- 13th October Coventry Building Society Arena

CBM staff

- **President**
  Steve Morley
  president@thecbm.co.uk

- **Chief Executive**
  Geraldine Bolton
  MCMI, Dip.OCR, MAAT, M.IIM
  geraldine.bolton@thecbm.co.uk

- **Company Secretary & Office Manager**
  Louise Campbell
  louise.campbell@thecbm.co.uk

- **Membership & Events Secretary**
  Melinda Jean
  melinda.jean@thecbm.co.uk

- **Media & Communications Administrator**
  Rachael Bromley
  rachael.bromley@thecbm.co.uk

- **Accounts**
  Marie Williams
  marie.williams@thecbm.co.uk

- **Fastener Sector Specialist**
  Derek Barnes
  derek.barnes@thecbm.co.uk

- **Forging Sector Specialist**
  Derek Bond
  derek.bond@thecbm.co.uk

- **Sheet Metal & Cold Rolled Specialist**
  Adrian Nicklin ISME
  adrian.nicklin@thecbm.co.uk

- **Health, Safety & Environment Consultant**
  Mark Sutton
  AIEMA, MRSPH
  mark.sutton@thecbm.co.uk

- **Energy Specialist**
  Kevin Kirk
  kevin.kirk@thecbm.co.uk

- **Policy Advisor**
  Phil Matten
  phil.matten@thecbm.co.uk

- **NMC Conferencing Supervisor**
  Marie Williams
  marie.williams@nmcvenue.com

- **Receptionist**
  reception@nmcvenue.com

- **Events Co-ordinator**
  Charlotte Robinson
  reception@nmcvenue.com

- **How to contact us**
  Confederation of British Metalforming
  National Metalforming Centre,
  47 Birmingham Road,
  West Bromwich,
  West Midlands B70 6PY.
  Telephone: 0121 601 6350
  Enquiries & Advertising:
  Rachael Bromley
  Media & Communications Administrator
  Email: Rachael.bromley@thecbm.co.uk
  Web: www.thecbm.co.uk
  Find us on LinkedIn
  Follow us on Twitter

CONFEDERATION OF BRITISH METALFORMING

CBM request Business Minister to support Manufacturing

The last thing I want to become is a 'merchant of doom' as I think there is too much of that about in our media as it is. However, it's difficult, as I stated in my last review, many of you have had no respite at all and whilst many of you are more optimistic, there are only a minority who are thriving, we really need that changing for the vast majority of you.

In the recent Crowe/CBM survey, 74% of the respondents were optimistic and it would be great if we could fulfil that optimism despite all the hurdles you are facing.

I was fortunate to attend a Make UK roundtable event with the Secretary of State for Business Rt Hon Kwasi Kwarteng MP recently. It was good to hear his positive support of UK Manufacturing, which I can assure you we don't get from every Minister. He was also positive about the future, albeit somewhat reliant on other departments, mainly the Treasury for support.

It was good to hear him update us on the investment in British Volt and mention the need for other Gigafactory's to sort EV car and commercial vehicle production and the investment in Nuclear power, where he specifically mentioned Hinkley Point.

When it came to questions I asked him the following:

'You gave us a positive outlook for the future, which whilst welcome, my concern at this moment in time is getting my members through the issues they face now and in the coming months, to see the benefit of this long-term investment.

He then asked me to answer my own question even though it wasn't rhetorical.

I did answer, but felt it didn't resonate fully, especially as I had laid out the issues and possible resolutions to BEIS civil servants the previous month.

I then took the opportunity to follow this up with a letter direct to the Secretary of State and Business Ministers Lord Grimstone and Lee Rowley.

I've detailed the letter in full below, to which we still await a response.

When I asked you about what support or actions the government were going to take to support companies in the short term, some but not all of the issues are set out below:

♦ Scaling up in an industry that is short of skill and labour

♦ Increase in costs with energy and labour being added to material and freight costs, which are already impacting our members

♦ Lack of clarity on the structure of STEM education and the Apprenticeship Levy not being fit for purpose

♦ Impact of poor cash flow and carrying debt which is causing a concern on big investment decisions

♦ Late payment remains a big issue (particularly in the auto sector.....automotive seems to the worst sector of all for this)

It could be said that in a typical Politicians response you then asked me what I would do, even though it wasn't a rhetorical question, which I then did answer.

Company Debt

Companies need time to pay, they are carrying debt from the pandemic either through Covid Loans or accessing Time to Pay from HMRC, both of these payments have now started to be taken at a time when sales haven't returned to anywhere near pre-covid levels. HMRC is now a preferred creditor and signs they are being more aggressive. Insolvencies will be rising without support for business.

The Recovery Loan Scheme has had a poor take up and isn't meeting industry's needs, especially as those with CBILS loans are not being supported by the banks into transferring them into one scheme.

Suggestions on what actions the Government should review:

CBIL loans paid back over 10 years instead of current 5 years (banks are stating they cannot do this but will under threat of administration!!)

Extend HMRC repayment terms for those that need it, especially those with a good payment history.

Release of Apprenticeship Levy funds to support training in downtime

Review the CBROS document, which outlines the realities that UK businesses are facing but also gives a practical proposal on how to navigate our way out of debt but also allowing them to invest in their future.

Energy Costs

Energy companies are not only increasing tariffs by 100%, the highest I have seen was 140%, but also are asking for a security deposit of £200 k. Whilst there are Geo-politics at play the government is not faultless and long-term investment strategies do not help anyone right now.

The renewable obligations scheme utilised by Energy Intensive sectors does not support other high intensive users who proportionally to turnover are similarly affected, even

worse the burden of renewable obligation cost (by giving some sectors exemption from it) means that other users pay more, this needs to be reviewed as a matter of urgency.

Further to this it's clear from the intelligence we've received that increases in the UK are substantially more than those of our EU competitors specifically Germany and France , not helped by the higher tax rates in this country , which could be reviewed . This is also another example of our members who export being seen as uncompetitive to their European customers!!

Trade Credit Insurance

On Trade Credit Insurance I think it's only a matter of time before we see cover being withdrawn due to the precarious position across the supply chain in all sectors and

• Steve Morley, CBM President

amount of debt businesses are carrying. We have already fed back to HMRC directly and your team at BEIS but with insolvencies already on the increase if TCI cover are seen to be reduced or even were to be removed altogether, this would be a disaster.

I will update members when we get a response.

Steel Safeguarding

This wasn't covered in my letter as it doesn't fall directly under his department. Many of you will know that the deal we have agreed with UK Steel was approved by HMRC on December 23rd and implemented from January 1st.

Whilst in theory based on previous data that CBM, DiT and HMRC had analysed the quota appeared to be set fairly. However, due to the interpretation of the specification by HMRC custom officials it has led the quota to exhaust far too quickly, meaning tariffs are now being requested.

While this was completely unforeseen, the impact this has on our members and wider engineering companies is extremely concerning. We have been on top of this throughout and are in direct dialogue with DiT and HMRC officials to find a resolution before anymore damage is done to all of those affected.

Steve Morley,

President of the

Confederation of British Metalforming

CONFEDERATION OF BRITISH METALFORMING

The UK's only specialist manufacturers' organisation for experts in metalforming

Why Join the CBM

You get valuable influence, business support, technical expertise and market insight as a CBM member.

Lobbying & Promotion

Get your voice heard within Government and the wider manufacturing industry

- Benefit from our active lobbying support, which has played a key role as post-brexit trade negotiations accelerate and the Government makes crucial coronavirus decisions.
- We collaborate with the Department for Business, Energy & Industrial Strategy (BEIS) on a weekly basis, covering issues ranging from Rules of Origin, electricity prices, Steel Safegaurding, to name but a few.
- Our mission is to represent UK metalforming in those industry discussions – and help you access opportunities through collaboration with a broad stakeholder group.

Compliance & Cost Management

Save money through your CBM membership

- As a CBM member, you get access to a range of practical services that save money and make operations easier.
- Our accredited energy tax rebate service is a key benefit – it's saved members £4 million+ annually in Climate Change Levy.
- You can boost your savings with our cost-effective Streamlined Energy & Carbon Reporting compliance service and Energy Saving Opportunity Scheme assessments – as well as discounted meeting room hire, our free business support hotline and more.

Marketing & Business Development Support

- Build relationships and develop opportunities
- CBM members come from across the supply chain – and work across automotive, aerospace, rail, defence, energy and Construction. We help you build relationships with potential customers and partners.
- You can also use our platform to promote your business – in Metal Matters magazine, at industry events and among our growing social media audience. Our popular website directory and Buyers' Guide is a popular way to get noticed by supply chain managers.

Technical Support

Leverage expert knowledge of metalforming techniques

- Whether you have a problem or want advice on a new process, our sector specialists are here to help. With your CBM membership, technical support is quick and cost-effective.
- Over 130 years' experience with our Sector Specialists who cover Forging, Fastening, Press work and Sheet Metal

Innovation & Knowledge Sharing

Keep your business on the front foot

- CBM events give you opportunities to share knowledge and best practice. Thanks to member days, sector group meetings, monthly market reports and more, it's easy to learn about developments that will help your business.
- Through your membership, you also benefit from our established links with universities and innovation hubs like Warwick Manufacturing Group, Advanced Forming Research Centre, Imperial College and Advanced Manufacturing Research Centre.

Training & Skills Development

Fill skills gaps and boost retention

- We offer training opportunities for technical and non-technical roles, so you can fill gaps in your business.
- In response to CBM member feedback, level 6 Apprenticeship (degree level) programme was developed by the CBMs Trailblazer group.
- The level 6 Tool Process Design Engineer Apprenticeship was specifically created for the metal forming sector in recognition of increasing skills shortages. It is the only Apprenticeship that recognises the unique and specialist skills for this senior technical role.

Health & Safety

- Our popular Health & Safety Group meetings provide a vital forum for sharing successes and getting advice on overcoming challenges.
- You have access to our HSE helpline, as well as discounted private healthcare and occupational health services.

NEW HR Support - Coming soon

CBM membership pays for itself thanks to the opportunities, access and cost management benefits you receive. Contact us to discuss your business needs and the best membership

CONTACT CBM NOW ON
0121 601 6350 or
email Melinda.jean@thecbm.co.uk

PROUD MEMBER OF CBM CONFEDERATION OF BRITISH METALFORMING

t: 0121 601 6350 · e: info@thecbm.co.uk · www.thecbm.co.uk
Confederation of British Metalforming Centre · 47 Birmingham Road · West Bromwich · West Midlands B70 6PY

CBM Exclusive members' deal offers a helping hand with your HR

It's been two years since Covid first arrived in the UK, bringing with it great uncertainty and economic aftershocks that most businesses have never experienced before.

As well as dealing with the challenges of keeping the lights on during this time of adversity, metal forming companies also needed to manage the needs of their workforce in unprecedented circumstances – adapting to new working practices to keep them safe and negotiating ever-changing Government rules and restrictions.

This period of change has generated its fair share of HR issues along the way, and for CBM members without a trusted source to turn to for advice, it's been even harder.

Exclusive member offer

That's why CBM and award-winning legal firm FBC Manby Bowdler have agreed an exclusive HR deal for members, to make sure that whatever life throws at metal forming companies, they have the knowledge and expertise to deal with it.

FBC Manby Bowdler provides a range of legal services to businesses including HR and Employment, Commercial Property and Litigation advice. The firm has a network of offices across the West Midlands, Shropshire and Worcestershire, and employs over 170 people.

FBC Manby Bowdler is offering a tiered service deal to CBM members, so there are different entry level points to cover different needs and budgets. This flexibility ensures that more organisations can benefit from the offer.

The benefits

CBM members joining up to the FBC Manby Bowdler service will benefit from having all their HR and employment law needs met by qualified lawyers, who know and understand the law.

The firm's solicitors are straight shooters, focusing on giving advice which is both commercial and pragmatic. They can advise on how to minimise legal risks and have a wealth of experience in successfully defending Employment Tribunal claims too.

Members signing up to the offer will have their own dedicated team, so it's not just a hotline number to call. Instead, the firm takes the time to get to know members' businesses and their challenges to ensure advice is tailored, not one-size-fits-all.

Members couldn't be in better hands either. The FBC Manby Bowdler team has a proven track record in providing sound legal advice and the firm has been ranked highly in both the latest Legal 500 and Chambers & Partners rankings, which are voted for by it's customers.

If you are a CBM member who would benefit from further HR support and would like to find out more about this exclusive offer from FBC Manby Bowdler please contact Louise.campbell@thecbm.co.uk

Geraldine Bolton, CBM's Chief Executive "I am delighted to announce a very exciting development in the range of services that CBM provides to its members, and a great addition to the one stop portal of support that we already offer. We are launching a brand-new Human Resource/ Employment Law service in partnership with FBC Manby Bowdler. This is an exclusive HR service, only available to CBM members. The CBM have been working with FBC Manby Bowdler, for a number of years, for their own HR services and I would highly recommend their excellent service from personal experience."

Crowe & CBM Manufacturing Outlook Report, Key Findings 2021/22

74% expect turnover to grow in the next 12 months

82% have trouble recruiting skilled employees

30% say their main barrier to growth is recruiting and retaining staff

90% believe the Apprenticeship Levy to be not effective

Those affected by minimum wage has doubled to over **40%**

82% don't believe government exporting incentives are effective

92% profits hit by price/ availability of raw materials

71% are members of a manufacturing network

55% believe Industry 4.0 will significantly or partially affect their business

31% say their go to external advisor is their accountant

60% believe government COVID measures are enough to get back on track

77% have made an R&D claim in the past 12 months

74% said they have a good relationship with their bank

2021 was a year when so much challenged the manufacturing sector. As our survey results reveal, it was a year of shortages, inflated costs, demand outstripping the ability to supply and the spectre of the knowledge that at some point there will be a real stretch on working capital funding requirements.

Post pandemic, the road will be bumpy, twisty and rough. Strong relationships identified with networks and trusted advisors need to be robust to achieve the levels of growth anticipated by the participants in our survey.

Read the full report here: www.crowe.com/uk/industries/manufacturing

Crowe is here to help, we have the following services in place to ensure your business stays on track

- Advice and implementation of business growth improvement tools
- Access to a specialist debt advisory team, to help raise funds for working capital and capital projects
- Tax advice, to help you to time your expenditure and claims strategically, considering the new increased tax rate
- R&D claim reviews, to see if you're missing out.
- Join our Manufacturing Business Network, we support manufacturers across the UK with a mixture of free face-to-face sessions, webinars and video calls.

To start the conversation, please contact Johnathan Dudley, Head of Manufacturing at Crowe, johnathan.dudley@crowe.co.uk

CBM can help manufacturing companies have a bigger voice with Government. As the leading trade association for metalforming companies, representing 40,000 employees and £4bn turnover, we are very instrumental in successfully fighting the challenges our members face. With the privilege of having a weekly meeting with the Department for Business, we can effectively feed in evidence from the coal face. With recent successes in lobbying for trade credit insurance and an amendment to steel safeguard quotas, together with saving our members £4m a year on their energy bills by claiming back climate change levy taxes, can you afford not to be part of this organisation? For more information on membership, please contact Geraldine.bolton@thecbm.co.uk

Automated preform design for hot closed-die forging

New practical tool for forging technology development and optimisation

Dr Nikolay Biba, Director, MICAS Simulations Ltd., Oxford.

In practice, very few forgings are produced in one impression. In order to achieve complete die filling, a single impression can result in excessive flash, forging defects, and large die loads. In most cases, a series of preforming operations are necessary to gradually form the billet material into a shape that is closer to that of the finishing die cavity. The number of preforming operations depends on the difference between the beginning billet shape and the finished forging shape. The optimal preform shape must ensure complete die fill with minimal flash and reduced forming load, while avoiding flow defects like laps and flow-through. Proper preform design should also minimise the die wear by reducing the metal movement in operations and achieving desired grain flow to control mechanical properties.

Despite numerous works in this field, preform design is often based on the trial-and-error method. Traditional preform design guide rules may work for simple parts like axisymmetric forgings but are often ineffective for complex irregularly shaped parts, particularly those with narrow ribs and thin webs.

There is an approach to developing a preform shape based on approximation of the metal deformation by so-called potential material flow. Potential flow is a hypothetic idealised motion of fluid that has no curl (rotational) velocity vector at any point of the domain, and by these means, it makes the formation of any laps or folds impossible. The potential flow velocity vectors are always perpendicular to so-called equipotential surfaces while these surfaces can be obtained as a solution of the Laplace equation in the flow domain. In the case of a closed die forging process, the domain for Laplace equation can be created between two surfaces representing the workpiece and the final forging, respectively. Of course, the actual material flow in forging is not a potential one, and there is a curl velocity vector in it. Meanwhile, it was found that the use of equipotential surfaces as a preliminary guess for a preform shape makes the formation of laps and flow-through defects much less likely while providing the complete fill of a finish die cavity much easier. A more detailed explanation of this method and the literature overview can be found in our work [1].

To make the above approach practically applicable in the industry, we have developed a specialised CAD program for automated optimal preform design called QForm Direct (powered by SpaceClaimTM). It finds the most suitable equipotential surfaces for the approximation of the preform shape, and creates a preform and preforming dies. This program is integrated with our metal forming simulation program QForm for verification and optimisation of the proposed preform shape by modelling the metal deformation as it happens in the real forging process.

The developed method and software have been implemented for several hot forging jobs, and all of them have proved their efficiency. Below is presented one such case where we developed the best preform shape for a hot forging of a cross-like part. The original technology used a round bar billet with a diameter of 65 mm and a height of 118 mm made of steel 20MnCr56 (1.7147 DIN) heated to 1200 C. The equipment was a 25 MN mechanical press. The first operation was upsetting the billet to a height of 60 mm. Then the billet was forged in preforming dies that were designed according to traditional guidelines, having increased drafts and radii. Thenfinally it was forged in the finish dies (Fig 1.). As we see when using the original preform design, a lap occurs in the finish forging that is clearly seen in the real part (Fig. 2 a,b) as well as clearly detected by simulation (Fig. 2c).

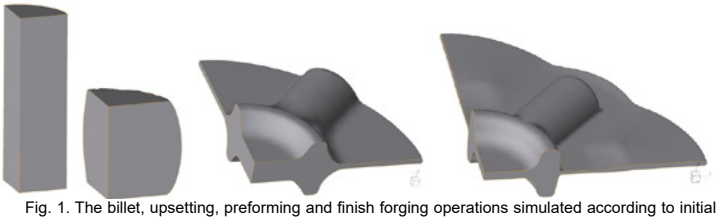


Fig. 1. The billet, upsetting, preforming and finish forging operations simulated according to initial technology.

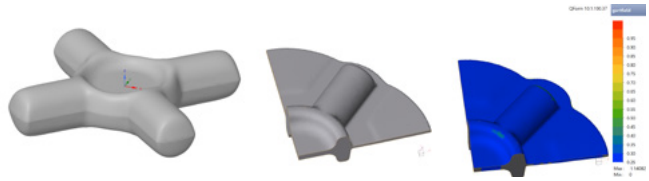
a. b. c.

Fig. 2. Actual finished forged part: a lap on a general view (a) and magnified defect zone (b) and defect locations predicted by simulation (c) shown by red zones of Gartfield indicator.

Continue on page 12

Continue from page 11

A new optimal shape of the preform was then developed using QForm Direct software. The equipotential surfaces used for its creation are shown in Fig. 3a. The forging sequence using this preform shape was simulated, and it didn't show any defect in the finished part (Fig. 3. b, c). After such verification by means of simulation, the preform dies were modified to the QForm Direct design and placed into production, while finish dies were left without any alteration. Trial forgings have shown the perfect quality of the finished part without any defect, as shown in Fig. 4. Moreover, modification of the preform allowed reducing the billet volume and saving the material by 6.7% and significantly reducing the die wear. An excellent practical result!



a. b. c.

Fig. 3. The preform shape based on equipotential surfaces (a), simulation of preforming (b) and finish impressions (c) using the proposed preform. No defects in finish forging are anticipated, as shown by the distribution of the Gartfield indicator.

a. b.

Fig. 4. Photo of the actual preform (a) and finished (b) forged parts using proposed preform shape (no material flow defects).

The proposed method and software are available for all CBM members in a test mode. If you need to develop a preform for your most complicated forging job, please, contact us, and we will provide you with a fast and effective solution. You may contact me personally for further details by email

micas@qform3d.co.uk or by phone +44 7578 576602, Nikolay Biba.

Literature

1. N. Biba, A. Vlasov, D. Krivenko, A. Duzhev, S. Stebunov, Closed Die Forging Preform Shape Design Using Isothermal Surfaces Method, 23rd International Conference on Material Forming (ESAFORM 2020)

Roll forming: supporting the production of new vehicle structures

Electric vehicle architectures offer both challenges and opportunities when creating strong, lightweight body structures. Dreistern's Automotive sales manager, Christoph Grüllich looks at the current build of EVs and discusses some of the solutions offered by roll forming

"If you look at the future, how vehicle structures are developing, OEMs are looking to simplify these structures and they are working more closely with tier suppliers to achieve this and reduce costs"– Christoph Grüllich, Automotive sales manager at Dreistern (pictured right)

We have this big structural change happening inside the automotive industry today driven by the need to reduce CO2 emissions. As a result, OEMs are now heavily invested in the development and production of electric vehicles (EVs).

In terms of work content there are fewer parts and less complexity in the assembly process, and the body structures appear simpler. However, for EVs the change in the body-in-white (BIW) requires more stability in certain areas. In the past, the rocker panel was just two simple profiles and some reinforcement sheets in specific positions for the jacking points or locating the B-column. So, you only needed reinforcement inside the rocker panels at points where impact resistance or a service requirement was needed.

Safety and cost challenges

The consideration for a side impact crash in an ICE power vehicle was focused only on protecting the passengers, whereas with the electric battery vehicles (BEVs) you now need to protect both the driver and the battery. And with the structure of the BEV the side crash impact zone is now reduced from 300/400mm down to around 150mm. This means all the force and power coming from the side crash impact needs to be stopped within 200mm and now requires the reinforcement inside the rocker panel to be in place over the whole length of the panel.

Some of the first versions for BEVs kept the external shape of the rocker panel and used an aluminium extruded profile that featured several chambers (multi-chamber parts), which absorb a lot of energy within a very small distance. But there are cost implications using this configuration. For example, a German OEM found that the cost of a standard rocker panel for an ICE vehicle was €40 to €45, completely assembled, but when they produced an initial version for BEVs, featuring the multi-chamber aluminium extrusion, the cost of the part increased to €120. The main reason for the high cost was the need for additional milling processes to insert any required holes in the profile. Now, our goal at Dreistern is to create a multi-chamber part or reinforcement inside this rocker panel, roll-formed not aluminium-extruded, at a cost of, around €80 to €90.

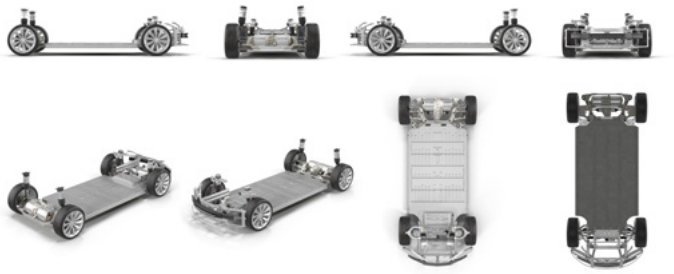
We are seeing some OEMs looking to convert an extruded aluminium part into a roll-formed aluminium part. Others are exchanging extruded aluminium parts for a roll-formed, welded, steel profile featuring single-chamber or multi-chamber parts and assembled together in order to create another multi-chamber part. To support this approach, we have developed two hat-shaped profiles and then three simple profiles, or single profiles, to fit inside the rocker panel, to create the multi-chambers and the crash performance that is required.

Roll forming also offers cost savings in that it requires less processes to create a profile. For example, with multiple models being built on one platform, the profile (of the rocker panel) can be the same for all, only the length will vary and possibly some of the hole punching. So, you don't need to change the tooling and you can change the lengths of the part without any additional cost.

This can be a benefit to the BEV segment where the required range of the vehicle, to some extent, dictates the length and width of the vehicle in relation to the battery pack size, i.e., the longer the range required, the bigger the battery pack, so the longer (or possibly wider) the vehicle (rocker panels, bumpers) need to be.

Continue on page 14

Continue from page 13

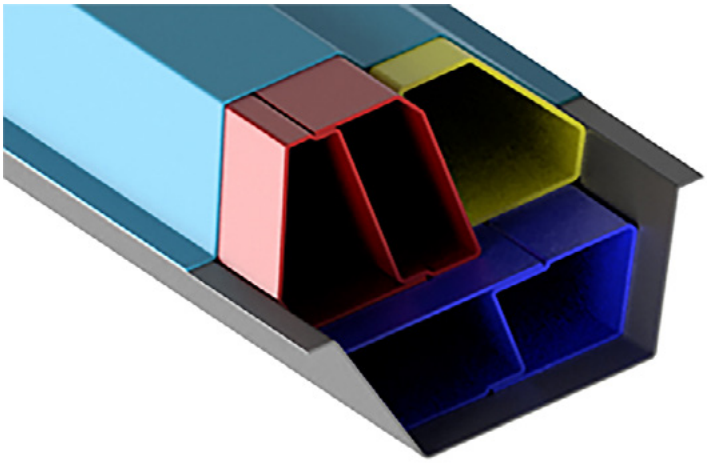


Roll forming can benefit the BEV segment where the required range of the vehicle, to some extent, dictates the length and width of the vehicle in relation to the battery pack size

Autonomous driving and flexible seating

Autonomous driving also offers some interesting opportunities for roll formed parts. Designers are looking at much more flexible concepts inside the car, how the seating might be reconfigured, providing more flexibility, and because of this we are now getting enquiries for roll formed seat rails up to 2.5 metre in length. This longer length is better suited roll forming as most seat rails for ICE applications are produced in presses and measure around 60cm in length. Producing longer length rails in a press requires different tooling and is more expensive. Also, we are now processing higher strength parts and we can roll form (cold form) steel up 1,750mpa.

We can also achieve good process speeds with roll forming, up to 200 metres a minute. This speed is reduced when adding processes like welding, punching or separating the part due to special lengths. For example, for a rocker panel, we can produce around four or five parts a minute. This might not sound like high output, but the part is completely finished, pre-punched and welded two or three times, depending on how many chambers you have inside that part.



Smart production systems will support the manufacture of highly accurate multi-chamber parts

Developing smart systems and processes

Looking forward, we are sure that we'll have to handle the changing properties of materials over the next 10 to 15 years. Also, for automated processes you need a more pre-sized parts in order to have the correct positioning of the components. That means we need to maintain the tolerances, let's say of one millimetre, across the whole length of the part, regardless of what material we are processing. To achieve this, we are developing intelligent roll forming systems to measure forming forces, to check the profile geometry and have an on-time and live regulation of the roll forming line. This allows the system to directly react and adjust the tooling according to the changing properties of the material over the length of the part. This intelligent system will also support predictive maintenance, helping to keep the lines running and avoiding unnecessary downtime. And the data gathered supports longer term analysis of efficiency and productivity, providing greater transparency of the material flow and process quality.

If you look at the future, how vehicle structures are developing, OEMs are looking to simplify these structures and they are working more closely with tier suppliers to achieve this and reduce costs. These developments in vehicle platforms, for EVs and autonomous vehicles, offer a lot of opportunity for roll formed parts. This process can produce precise, scalable parts and structures that meet the functional and production requirements of these vehicles, as well as supporting flexible manufacturing.

Closer collaboration in engineering

So, for roll forming, we see a big increase in number of parts and especially number of applications inside the car. We're already seeing a change in the approach from OEM and tier supplier customers. Previously you got an enquiry for a part and there was no engineering required. However, since 2019, there's more discussion about a geometry and design, how we can manufacture it, how we can transfer or modify the part in order to be roll formed. How can we change punching patterns in order to be able to have them in different models or in different lengths. So, we are developing our equipment and systems to meet these changing requirements, supporting the production of a new generation of vehicles.

Link to AMS original article

https://www.automotivemanufacturingsolutions.com/

Advanced surface coatings & treatments for protecting tools against wear

Author EUR ING John Yarnall CEng,CEnv,MISME, FIMMM,

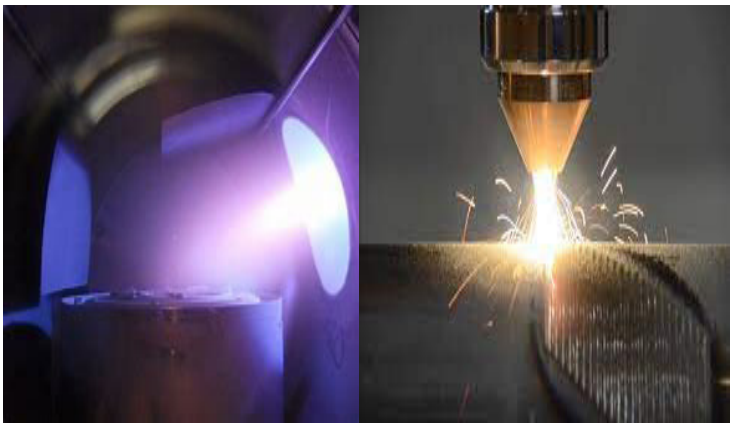
Introduction:

I am delighted to present this next instalment as part three series post COP 26 conference in the UK .This article was written originally to celebrate the 75 anniversary of The Institute of Sheet metal Engineering (ISME) who can trace its formation to 1946 as a learned body of individuals and corporate members. Like many other metal forming groups and trade bodies in the UK, skills and technological advancement in metal forming technology has remained the hallmark of their mission to support the forming community, and are rapidly developing their reach within the UK and to an international audience. Not least the Institute recognises the prime importance of advanced tooling development for enabling technologies such as surface engineering, sustainable processing, & environmental considerations being crucial components of sheet metal forming and fastener manufacture towards the drive to 2050. In an increasing digital manufacturing economy 'the tool surface' will play a crucial role in protecting the most valuable asset of any tooling system.

In this article I have tried to link metal forming manufacture to one of the most critical elements of tooling and its protection in service by the use of surface coatings and Laser cladding together with advanced metallurgical heat treatment processing. This link is a crucial part of tooling design philosophy for the manufacture of high volume, high quality precision parts to the market utilising energy sources at lowest economic cost available. It is worth noting that to achieve these objectives in a world of light-weighting within a 'reduced carbon footprint economy', coatings and treatments have a major contribution to make to the overall success of 'smart tooling concept'

(Fig 7.1).Reduction of sheet forming and fastener costs are a crucial factor in the process economics. The new agents for protecting tools now range many which can be selected at the design stage of the parts to be made. Some of these will be discussed in brief detail.

Advance additive manufacturing by Laser Metal Deposition, (LMD) and plasma thermochemical treatments together with surface coatings and lubrication have made possible considerable progress in protecting tools surfaces. These surfaces assist metal forming of light alloys based on aluminium, high yield strength and carbon steel alloys. A newer aspect of tooling economy now features other environmental and economic benefits which are now prime consideration for the reclaiming and reuse of tools to help fit the circular economy models of the future. The benefits of associated cost reductions and lower energy use being a major bonus. All helps to aid our manufacturing communities and their need to reduce burdens on society in a sustainable way.



In this instalment I will focus on tooling surface modifications and coatings which are now commercially available to achieve best practice sheet metal forming of a selection of sheet metal alloys which comprise the vast majority of sheet structural parts being made. The largest sectors of 'white goods', automotive, aerospace and general engineering products will only be indirectly cited as examples, as more specific reference has/will feature in my other series of articles. Space limits my coverage of some of the novel sheet/bulk manufactured tooling now being produced for high temperature applications, medical devices, space applications and composite sheet materials. I plan to present details of this new application area in a future series article. . As a final section I have added a short section on fastener tools which have much in common sheet forming in terms of tool coating, albeit this can be considered a 'bulk' metal forming process. Tool coating and additive laser welding are similar considerations as far as tool surface protection is concerned.

Laser Metal Deposition (LMD) and additive manufacture of tool and die surfaces.

Laser Deposition Welding is a surfacing technology used to produce a surface cladding on to dies and tools to provide a metallurgic ally bonded wear resistant layer up to several millimetres thick for some applications. This process is particularly favoured for tool surface repair and for applications where a thick anti-wear layer is required for severe sheet and bulk metal forming applications. There is considerable scope to apply a selection of cladded layer alloy deposits to tooling surfaces. The choice of cladding alloy can be selected to provide the best wear and corrosion resistance for a specific tooling application. These range from Ni/Cr layers or hard wear resistant steel alloys, or in combination to form a duplex surface with PVD/CVD for low friction characteristics, or plasma nitriding thermochemical treatments.

Continue on page 16

Continue from page 15

Laser Cladding is a welding process, or by use of metal powder feedstock which uses a precisely focused laser beam to generate a melt pool on a component surface under inert flux conditions. A metallic feed material is simultaneously injected into the melt pool and fully melted to build up a deposit.

• The Feed material usually takes the form of a metallic powder but can also be a wire.

• The precise nature of the process allows the quality of the coating to be accurately controlled.

• The Key to successful laser cladding is controlling the heat input into the base material, which can be minimized whilst maintaining a high strength metallurgical bond.

• The very fast cooling rate associated with laser cladding has the effect of producing fine high strength microstructures with minimal effect on the mechanical properties of the base material

Processes:

• MMA
• MIG
• TIG

Benefits:

• Consistency of product- new and repair tooling

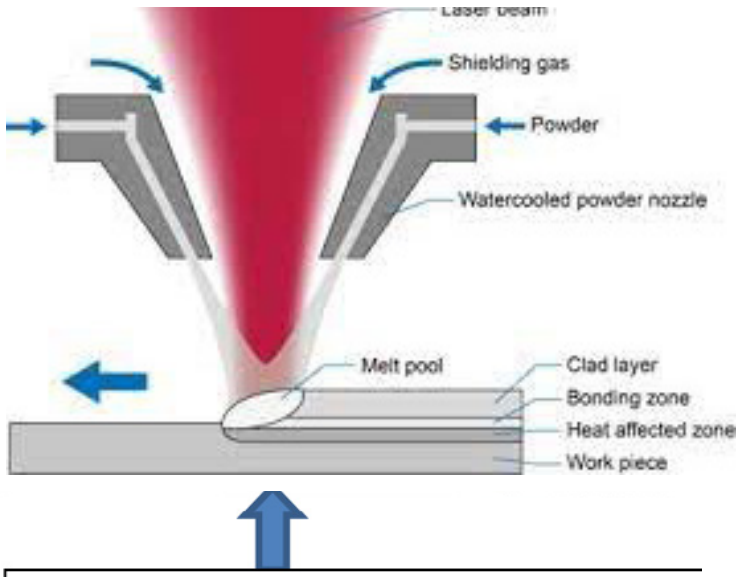
• High-level quality integrity across the cladded deposit

• Can be applied to both large tools, including chassis members and' body in white' automotive panels for example.

• Scope to produce thick layers up to several mm with high metallurgical quality

• Able to produce complex shapes to most tooling exterior designs. Some examples illustrating LCD additive process:

Fig 1 Laser Welding Deposition



Schematic of LWD process using alloy powder feed with HP laser beam. The weld deposit speed is controlled...

Fig2 Back of die wall showing weld deposit

View of a press tool die LDC surface deposit before finish machining to finish tool size.

Typical family of alloys used in Laser Metal Deposition (LMD):

• Nickel Alloys
• Cobalt Alloys
• Tungsten Carbide
• Ceramics

Smart forming tooling for metalforming:

Surface engineering can now be added to the design and tooling process system via digital menu system. The advantage of this approach is to pre- design- in the best tooling surface for the process functionality of the parts to be produced. With this facility tooling material, heat treatment surface finish can all be 'dialled- in' to form a process route and a digital twin made from the initial tool manufacture to redesign and recycle/reuse. The economic advantage being that a predicted reproducible tool life and process performance can be made. This further helps the manufacture and their customer to help with costings and JIT requirements under real time supply conditions. The following graphic illustrates the circular nature of integration of the tooling system parameters: Moveover, a 'Digital Twin' can be made for post use tool replication and surface manufacture.

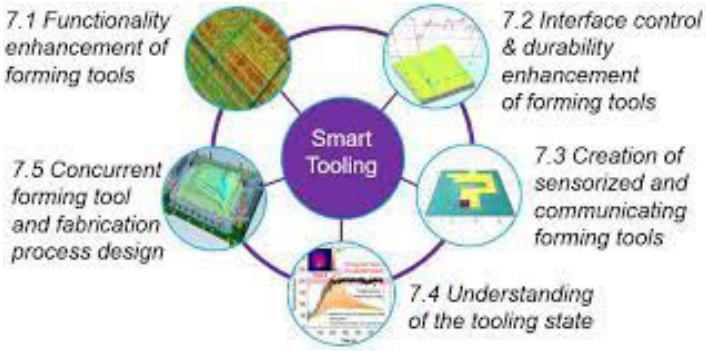


Fig 7.1 to 7.4 illustrating the smart tooling cycle. This concept can be expanded to include surface and heat treatment modelling via digital interface. This will become an important feature in OEM/supplier business relationships over the next years as factory 4.0 is introduced.

Continue on page 17

Continue from page 16

The benefits of tool surface texturing for forming of light alloy, steels and other sheet material alloys:

As today's manufacturing industry has to cope with increasing demands for lightweight design, especially in the transport industry .The extensive use of lightweight materials, including aluminium, magnesium and titanium alloys, is emerging .Aluminium alloys provide several advantages, including high strength to mass ratio and high corrosion resistance, and thus attracts large attention in engineering applications such as automotive and packaging. Sheet metal forming covers a broad range of processes, all designed to mechanically deform sheet material into a shape without material removal. Among them, deep-drawing is one of the most commonly used forming processes in automotive and packaging applications, since it allows cost-effective mass production of sheet components.

Tribological phenomena between tool and workpiece can significantly influence metal forming processes. Friction at the sheet metal–die interface is at the heart of it, affects the material flow in the manufacturing process, and wear on the tool surfaces could lead to changes in the boundary conditions of the process, greatly influencing productivity and product quality. The forming of aluminium sheets presents a significant challenge due to the low formability compared to steel and the materials' vulnerability to undergo galling with the forming tools' Galling' is a severe adhesive wear mechanism, often seen in sheet metal formed parts and parent tooling.

Controlled texturing of the surface of tooling has considerable proven benefits as a means of controlling friction and wear with its subsequent tool and part quality failures. The following cites the main benefits. This can be a complex topic, but it's a surfacing technology which is in regular commercial use by sheet metal forming manufactures which augments the tool process lubrication and surface coating of tool surface. It does not replace these and the system as whole.

• Friction is reduced as the texture degree is increased. This effect is probably attributable to the greater ability to retain lubricant in the pockets. Some of the related observations:

• Low initial friction is not a guarantee for good galling prevention.

• Present studies underline the key role of die topography and the potential of die surface functionalization for galling prevention. The generation of stratified surfaces with high polish degrees on the bearing surface combined with retention pockets are key feature to reducing galling and wear.

Many practical assessments on working tools in press shops are on-going. Further reporting on the benefits and mechanism will feature in a future tooling series.

Tool & die vacuum heat treatment for forming tool steel grades:

A high quality tool steel tool is a prerequisite to successful sheet metal forming tool performance. There are a number of generic and proprietary grade now available. A number of standard grades, namely, high Chromium, high carbon such as BSI 'BD' series steels are often chosen, but there are also grades specifically designed to meet the high requirements now placed on much cold work tooling such as powder metallurgical (PM) tool steels with high toughness and chipping resistance. The tool user has to make an informed choice of grade and vacuum heat treatment available. To choose the 'right' tool steel for the application it is crucial for many reasons not least for the optimal application of tooling surface treatment selection.

The obvious reasons being:

• The tool must have sufficient wear resistance.

• The tool must perform reliably and not fail due to premature chipping, cracking or plastic deformation. An optimal tooling economy—the lowest possible tooling cost (including maintenance) per part produced—can only be achieved if the correct tool steel for the application in question is used.

• Can the tool steel grade be surface treated or coated?

• Is the grade suited to cold forming the material being formed in its pre H/T and rolled condition?

• Can the tool steel be recycled and reworked.

Some basics of tool heat treatment using vacuum H/T technology:

The heat treatment of tool steels (and any other steel heat-treatment procedure) relies on a given set of metallurgical principles. For example, the formation of martensite relies on:

• The carbon content of the steel
• The alloying elements contained in the steel
• The appropriate austenitizing temperature
• The appropriate rate of cooling
• Environmental considerations

It does not matter if one heats the tool or steel by an oxy-acetylene gas torch or a vacuum furnace or a fluid-bed furnace, the steel will respond if all of the above parameters are met. The principles of metallurgy suggest that steel does not care from where it receives the temperature, it will respond to the temperature and cooling rate if there is sufficient carbon present to form martensite. However, to guarantee the optimum metallurgical control so as to prevent cracking, surface oxidation, temperature uniformity of the tool being treated, and microprocessor controlled vacuum methods are to be preferred. Moreover, vacuum H/T places a much lower burden on the environment!

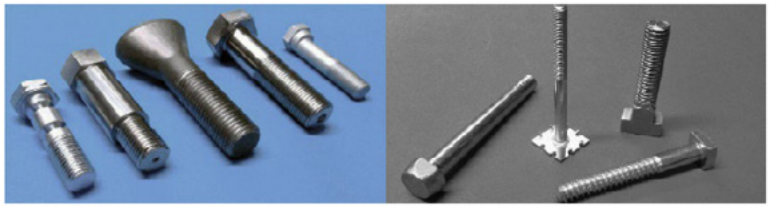
Continue on page 18

Continue from page 17

The method of vacuum heat treatment has been with us for many years, but only in the past 25-30 years has the heat-treatment industry has seen a significant growth in the use of vacuum-processing technology, particularly with the ability to capture and store data as a result of the growth of PC/PLC technology.

When one considers process technology and its growth as a result of vacuum H/T, it supports a learned paper written for first ASM European conference, held in The Netherlands in 1991. The writer forecast that the future of the heat-treatment industry was to "make a silk purse from a sow's ear" (using low-alloy materials to enhance the surface characteristics as well as the core properties). Consider the following processes that are now conducted under low-pressure (vacuum) conditions.

Fig 3



Typical threaded fastener products which are high speed, high volume manufactured using surface heat treated alloy tool steels. Curtesy: Smith Bullough Ltd Wigan, UK

Fastener products are a typical engineering application: tooling grades and anti-wear surface treatments.

Treatments and coatings:

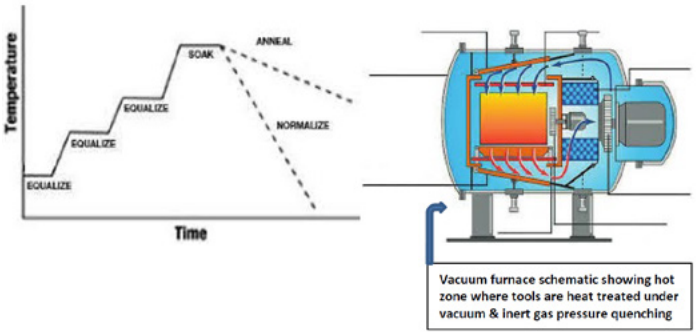
- Low-pressure nitriding
- Plasma nitriding technologies
- Low-pressure carbonitriding
- Low-pressure carburizing
- High-temperature/low-pressure carburizing
- Tool-steel heat treatment with high-pressure gas quenching
- Quench technology utilizing blended gases of nitrogen/hydrogen or nitrogen/helium
- Thin-film hard coatings (PVD/CVD)
- And many others now being developed for specific purposes

For tool-steel heat treatment, however, vacuum offers a distinct advantage: there can be no surface oxide attack at the surface of the steel (provided that the oxygen source is not already present or has been carried into the process chamber). This means that there can be no intergranular surface oxidation (IGO). It also means that, provided the appropriate stress relieving steps have been considered and there has not been any suspect machining practice, the distortion will be kept to a minimum with only a minimum grind-stock allowance needing to be made. This is one of the technical illustrations now being practiced by many heat treatment shops, and serves to demonstrate how far advanced the importance of 'best practice' tool heat treatment has become over the past 25 years.

Some basic elements of Tool H/T practice:

H/T involves the transformation from austenite to martensite and through to the appropriate tempering, normalising and annealing processes which must be used to ensure optimum functionality of performance of both the bulk and surface of the tool in service. These properties are dependent upon selecting the appropriate rate of heating, cooling and final temperature of treatment. There is a prescribed thermal treatment regimens used for each tool steel grade by most heat treatment service contractors. H/T contractors will advise at the time of ordering. But as a general guide figure 3 provides a set of sequences for heating and cooling of tool steel grades in vacuum. A full feature article will be presented on vacuum heat treatment theory and practice in a future series.

Fig4. Heating and cooling cycle vs treatment time in vacuum furnace.



It is worth noting at this stage that the vacuum system as illustrated serves to describe the surface coatings and treatment methods with additional plasma generation incorporated to deposit the layered wear resistant surface on to tool surfaces. Lower energy and environmental impact is one of the main features of these processes. This topic will be a main focus of future series of tool protection using plasma generated, environmental friendly processes.

Continue on page 19

Continue from page 18

Fig5: List of Tool Coatings & Treatments:

Coating/treatment	Thickness/depth micrometres	Max Service Temp.Deg. C	Hardness VPN	Coating Tech	Application	Rating-Forming Alloy
TiCN PVD	2-4	300	2,800	PVD Arc	Forming dies/punches	High hardness ferrous alloys
TiN	2-4	450	2,800	PVD Arc	Forming tools	Medium duty
AlTiCrN	3-8	850	3,200	PVDArc/HIPIMS	Forming Tools	Non-ferr. alloys
AlCrN	2-4	1050	3,000	PVDArc HIPIMS	Forming Tools	Various Alloys ψ
CrN	4-6	700	2,300	PVDArc HIPIMS	Dies/punches	Various Alloys ψ
a-C:H:W (DLC)	4-6	300	2000+	PVDubm PACVD	Dies/Tools	Non-ferr. alloys
TiC	6-10	400	3,200	CVD. 1000 Deg.C	Dies/tools	Open tolerance ϕ
TiN-TiC-TiN	6-10	500	2,500	CVD. 1000 Deg.C	Dies/Tools	Open Tolerance ϕ
TiC+MoS2	8-10	500	3,200+2000	CVD low friction	Dies/Tools	Open Tolerance ϕ
Boron Nitride	10-25	500	3,000	PCVD	Dies/Tools	Open Tolerance ϕ
Plasma Nitriding	Case depth ~0.2mm	350	1,200	Ion Plasma	Dies/Tools	Hardened Tools #
Duplex PVD+PN	Various	350	1,200+2,500	PVD + Ion nitride	Dies/Tools	Hardened S.Tools#

Key: **TiCN- Titanium Carbonitride**

TiN- Titanium Nitride

AlTiCrN- Aluminium Titanium Chromium Nitride

AlCrN- Aluminium Chromium Nitride

CrN- Chromium Nitride

TiC- Titanium Carbide

a-C:H:W- Metal Carbon DLC (diamond like coating). (Low Friction properties)

TiN-TiC-TiN- Titanium Carbonitride, Multi- layer. **TiC+MoS2- Titanium carbide + Molybdenum Disulphide**

ψ Non-Ferrous.i.e. High strength Aluminium alloys/HSLA steels

ϕ- Open tolerance: heat treatments after coating

This list of tool surface treatments is but a condensed overview. The choice of tool surface and tool steel grade and post machining process is a complex set of interacting parameters. It I recommended that a full surface engineering design survey be carried out prior to specification of tooling surface required to meet the production system requirements. It is pleasing to note that with tool coating data now available via various specialist sources, the task of tool selection at the design stage can now be realised with less risk than it was 25 years ago. Tool life Certainty will always be a challenge, but with Digital Manufacturing systems now available and developing the future of sustainable tooling is upon us.

References & for further information:

1. IonBond IHI Group, Consett, County Durham, Tel. 01207 500 823. Email: infouk@ionbond.com

2. European Aluminium Association (EAA). The Aluminium Manual, 2015

3. Hauzer Techno Coatings, BV. IHI Group, The Netherlands

4. International Deep Drawing Research Group, 38th Annual Conference- Online Surface Engineering. Influence of varying material properties on deep drawing process. K Krachenfels et al, Inst manufacturing Technology, Alexandra University, GmbH.

5. New Trends in Thin Coatings for Sheet Metal Forming Tools. C. Escher et al. Dorrenberg Edelstal GmbH, Germany.

6. Advanced PVD Coatings for Protection of Dies and Tools. National HIPIMS Technology Centre, Sheffield Hallam University, UK. P.Eh Hovsepian and AP Ehiasarian.

7. Voestalpine, Uddeholm Cold Work Tool Steel Family Grades for Sheet Metal Forming. United Kingdom, Taylors Lane. B69 2BN. Tel 0121 552 5511. www.uddeholm.co.uk

8. CVD Tool coatings;

9. Laser Cladding using LCD of tools via Lase. www.lase.co.uk

10. BorTec GmbH, Huerth, Germany. www.bortec.de

11.Surface Innovations Consultancy, UK

12. Hauzer Techno Coatings, BV. IHI Group, The Netherlands

13. International Deep Drawing Research Group, 38th Annual Conference- Online Surface Engineering. Influence of varying material properties on deep drawing process. K Krachenfels et al, Inst manufacturing Technology, Alexandra University, GmbH.

14. New Trends in Thin Coatings for Sheet Metal Forming Tools. C. Escher et al. Dorrenberg Edelstal GmbH, Germany.

15. Advanced PVD Coatings for Protection of Dies and Tools. National HIPIMS Technology Centre, Sheffield Hallam University, UK. P.Eh Hovsepian and AP Ehiasarian.

16. Voestalpine, Uddeholm Cold Work Tool Steel Family Grades for Sheet Metal Forming. United Kingdom, Taylors Lane. B69 2BN. Tel 0121 552 5511. www.uddeholm.co.uk

17. CVD Tool coatings;

18. Laser Cladding using LCD of tools via Lase. www.lase.co.uk

19. BorTec GmbH, Huerth, Germany. www.bortec.de

20. Surface Innovations Consultancy, UK

A future Instalment: topics for Part 4 in Series. Planned for 2022/23

1. Case histories and developments of tool coatings and treatments for PM Tool steels used for high volume sheet metal forming

2. Hybrid & Duplex anti-wear coatings for sheet metal forming-automotive & engineering structures

3. Multi-material tools and 3D additive manufactured tool surfaces

Industry 4.0 - How to ensure successful implementation

Author Mariana Carneiro (Kaizen Institute)

There is no doubt that the world is becoming increasingly digital. Today, 127 new devices are connected to the internet every second, people check their mobile phones around 150 times daily and the processing power of computers doubles every 18 months. As far as the manufacturing industry is concerned, the tools associated with Industry 4.0 have been part of organisations' strategic plans for several years now. However, 7 out of 10 digital transformations fail.

Why are digital transformations failing?

There are several reasons that lead to the failure of a digital transformation project. At an initial stage, the lack of a complete diagnosis of critical points and design of a clear digital strategy can lead to the implementation of digital solutions in low priority areas and activities with little return on investment. Moving to a global rollout without first conducting a successful pilot, and defining a phased deployment plan can be another reason that leads to a never-ending rollout.

Furthermore, moving towards implementing digital solutions without understanding the business can also result in automating waste rather than addressing the root causes of problems and simplifying processes. Finally, the disregard for company culture and for training people in the new tools contributes to the lack of motivation in using the new digital tools.

What is Industry 4.0?

Also referred to as the fourth Industrial Revolution, its aim is to improve process efficiency and productivity through the implementation of three major complementary approaches: automation, digital information flow and advanced analytics.

Automation refers to the application of computerised or mechanical techniques with the aim of reducing the use of labour in any process. This is done using industrial manufacturing robots, collaborative robots, automatic guided vehicles (AGV) and autonomous mobile robots (AMR), automated warehouses and various additive manufacturing techniques (example: 3D printing).

The Karakuris systems are also considered automation systems although they are technologically simpler solutions that use gravity to mechanise physical tasks. Some examples of automation in semi-automatic production lines are automatic palletising or moving products on conveyors.

The second critical axis for a digitalisation process is related to the information flow. Automating the data collection on processes, equipment and manufacturing is key to ensuring a continuous flow of up-to-date information. In order to obtain this, it is necessary to install data collection sensors, to connect equipment (Internet of Things) and to use virtual/augmented reality.

The use of sensors at key points in the process enables the most important information to be transmitted to the control rooms, such as temperature or speed, which is later used for decision-making. Augmented reality, on the other hand, can serve to carry out maintenance tasks remotely. In this case, the operator performing the tasks on site wears virtual reality glasses that allow him to communicate with a specialist technician who is in another location, showing him first-hand what's being done and receiving instructions by voice or images from the remote specialist.

As for advanced analytics, it handles and analyses information from the various processes in a much faster way and proposes solutions for well-founded decision making. This is done using tools such as data mining, business intelligence reporting, digital twin and artificial intelligence.

An example of the application of these tools can be, based on the data collected by sensors, to make wear and tear forecasts of the parts of a piece of equipment, or correlations between the variations of the different process parameters and the final result in the produced product.

Although the process of collecting, processing, and analysing data can also be done manually, through observations and time surveys, the digitalisation of this process brings greater reliability and speed, allowing decisions to be made more quickly and assertively.

How to succeed in implementing Industry 4.0

Upon reviewing the list of technologies listed above, it quickly becomes evident that they support the business. As such, and to exploit their full potential, it is necessary to start with a digital maturity diagnostic to understand what the current situation is. This diagnostic assesses the maturity of the organisation according to several aspects, namely digital and data governance, cybersecurity, employees' digital skills, agile implementation, automation, digital information flow and advanced analytics.

Once the digital maturity has been diagnosed, the identified deviations compared to industry standards should be analysed and the digital solutions applicable to the pain points and opportunities detected should be understood. At this stage, it is crucial to compare the ROI between each of the identified solutions.

The next step is to implement in a pilot where processes should first be reviewed before any digitalisation. This review includes the re-engineering of critical processes which ensures that wasteful automation is avoided. This pilot phase serves to validate the designed solution concept and confirm the expected ROI. It is an essential step for the success of the company's global transformation.

Once the successful implementation of the pilot has been confirmed, a multi-stage roll-out should be initiated. Firstly, at the level of the pilot area, i.e., a department or a site - and only then to extend the process globally to the whole organisation.

Management and technology must work together to achieve a successful digital transformation, ensuring a focus on people and processes. Throughout implementation it is essential to ensure that employees are trained in the new tools, that leadership is involved in the strategic incorporation of this initiative, and that the ROI is evaluated in each new area where the solution is implemented.

CBM's fastener manufacturing membership is looking at addressing the skills gap. Training in the Cold Forming Industry Part 2

(part 1 in MM Edition 59) Author Derek Barnes

A recognised expert in both cold forging technologies and the development and training of its operational personnel, Derek Barnes is keen to dispel the perception that operating and managing its machinery is the mythical 'black art' it is often claimed to be and structured training should be the cornerstone of successful businesses.

Following on from the article, Dispelling the Black Art, which discussed the need for structured training for Machine Setters in the Cold Forming industry, in this article I will discuss the three-stage training process showing how to establish sustainable training and produce the next generation of Engineers.

The Need for Training

Cold Forming machines and tooling are very complex and are used to produce high volume precision fasteners and parts that are used across the Automotive, Aerospace, Military, Construction and General industries. The quality demands of these industries can be very exacting, which leads to requirement to set the machines with accuracy and repeatability.

Having a structured standardised training approach is the best way to achieve the product quality consistently batch to batch and improves efficiency by reducing change over times, reducing scrap and improving tool life.

Organised training is also a great way to attract new people into the industry and also retain staff, as they can see what they will learn, how long it will take and fully understand what is expected and what the outcomes will be.

Stage 1: Basic Training

The aim of the basic training is to train how to set-up a machine safely and correctly, make necessary adjustments, run the machine, size the part and troubleshoot any issues found. It's an opportunity to get the basics in and encourage best practice. Much of this will stay with them for the rest of their career, so it is important to teach best practice from the start.

At the end of the basic training the trainee will be signed off as competent to set-up a machine under minimum supervision. It is impossible to cover every occurrence and every part, which is why some supervision is necessary after basic training.

The starting point of the training should always be with theory. Discussing and illustrating what happens during the process gives a foundation to build upon and this theory will be referenced time and again once training on the machine starts.

The theory covered should include as a minimum:

- Tooling materials, properties and wear points.
- Tooling assembly, fit, form and function.
- Understanding wire properties and material flow.
- Understanding of machine mechanisms.
- Cold forming theory. Standard geometries.
- Building the progressions to achieve the final part required.

There is a lot of detail for trainees to take in and care must be taken not to overwhelm them. To stop this from happening the theory is presented as part of the training documentation, either as pre-printed documents or even better the trainee making their own notes as the trainer presents the information. This allows for access at any time to confirm their understanding of the process. Another benefit of the trainee making their own notes is that it gives instant feedback to the trainer as to whether the individual has understood what has been taught. That feedback loop is very important for the trainer to show the progress and also allow them to develop the training to suit particular learning styles.

Before starting to work on the machine, safety must be made the number one priority and be stressed at all stages. The combination of high tonnage machinery and hardened tool steel is potentially dangerous and a healthy respect for the process is required.

Continue on page 22

Continue from page 21

When training on the machine commences it must be carried out in a structured way, going through the set-up procedure in order creates the method of setting. This should always be documented in a training manual for each specific machine. The manual is used as a training aide all the way through the 3-stage process. The trainee should be encouraged to make their own notes and sketches within the manual to help them to understand more fully. The manual can then be used at a later date to reference parts of the setting procedure that they may have forgotten or not be too clear on. This creates self confidence that they can solve machine issues themselves without always having to ask someone else.

The manual breaks down the process into a series of steps that can be followed through in order to set-up a machine. It also contains tips of what to look for when troubleshooting issues.

Introducing setting measurements alongside the theory and practice of setting, makes the process more scientific and not only helps to set the machine quickly and accurately they also help to reduce scrap by reducing set-up scrap and improving tool life from accurate setting.

When the training set-up is complete there will be an opportunity to do some training on troubleshooting running issues but at this stage it should be kept to a minimum, with the emphasis being more on doing set-ups to give the trainee as much experience as possible changing the machine over and setting correctly.

Part of the basic training is learning the terminology for both the tooling and the machine. Also starting to get an understanding of the machine mechanisms and timings, which help with their knowledge of how the tooling moves.

Most machines have a process monitor fitted and the set-up and operation of the unit is included in the training. It needs to be explained that it should be used as a tool to help with the machine setting and the various read outs need to be interpreted to improve the set-up.

Once a good part has been produced the training focus moves to measurement. The correct use of gauges be shown and also the importance of visual inspection. This leads nicely into discussing what defects could be present and how they relate back to the tooling.

Training is also carried out on how to use and fill in the required documentation, such as daily logs, first and last article inspection sheets, hand over logs and quality documentation.

Stage 2: Gaining Experience

Once the trainee has been signed off as being competent to set-up a machine the next stage can begin. This is a period that will help them to gain more experience in a production environment, running jobs and troubleshooting.

It isn't possible to cover every eventuality during the basic training stage and indeed isn't desirable as it can lead to overloading them with too much information when everything is new to them and cause them to become confused and not really take in any information.

They will naturally come across situations that they haven't seen before. When this happens then it's important to re-emphasise what was learnt during basic training and refer back to the training manual, the forming theory and their additional notes. They should also add to their notes to help them in the future.

The first thing to do is to pair them with a mentor, ideally the trainer should be the mentor, but if this isn't possible then another suitable person should be appointed. The role of the mentor is to support the trainee and be the person they go to if they need to ask advice. It is really important that the mentor understands the training method and stays within its bounds to maintain the learning process.

Communication between the trainer and the mentor is key to ensure that best practice is being followed and feedback to the trainer helps to modify training methods for future candidates.

Worst case scenario is that the mentor starts to retrain. Their role is to offer support and advice and refer the trainee to their training manual and documentation in order to follow the correct procedure. If there is doubt over anything then the trainer should get involved in order to steer things in the right direction.

During the "gaining experience" period, the trainee should set and run production jobs which are the same parts that they have been trained on this allows them to gain confidence in their own ability and also learn what sort of running issues occur and how to solve them. It also helps them to understand in more detail the types of defects that occur when tooling starts to wear.

Continue on page 23

Continue from page 22

If they are making good progress and confidence is high, then different parts can be tackled, which will push their understanding and knowledge further. Although they may need more supervision during the initial setting.

Stage 3: Development

The development stage starts once the Setter is setting and running parts and solving most issues without any help.

The aim of the development stage is to build on their knowledge and further expand their understanding of the forming process and the machine operation and the tooling.

It now becomes a combined effort from the trainer and the engineer and will vary depending on the ability of the person concerned.

The aim is to develop the thinking of the individual to create an all-round skilled person with the ability to set development jobs and feedback to engineering on outcomes to improve efficiencies.

There are really no limits and the continual development of the machine setters should be a high priority for any company that wants a highly motivated team with the ability to solve problems and improve the process efficiency in all aspects and give the customer what they want.

Summary

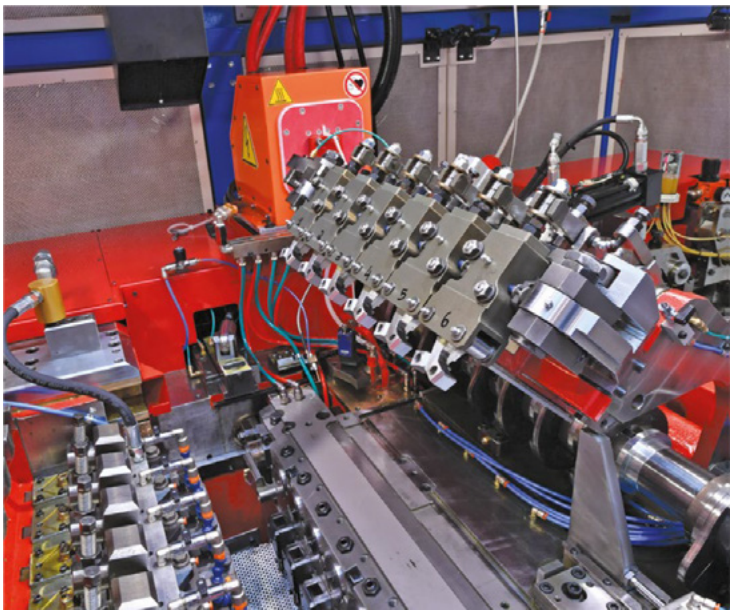
Training machine setters is a three-stage process.

1. Basic training. Teach how to assemble tooling and set the machine safely to produce good quality products. Understand the tooling fit, form and function. Understand basic forming theory and the importance of the progressions. Have a comprehensive training manual and use it. Use setting measurements to make the process more scientific.

2. Gaining experience. Gaining confidence by setting and running production jobs and troubleshooting any issues. Understand more about tooling wear and its effects. Learn more about the machine. Supported by a mentor.

3. Further development. Learn more in-depth understanding of forming theory and machine operation. Set up new parts and feed back to engineering on tooling and running issues. Work as a team to improve the efficiency.

Images courtesy of Carlo Salvi



About Derek:

Derek Barnes is an independent consultant who is truly passionate about cold forming and dedicated to driving improvements in both processes and education in the fastener and other sectors reliant on the technology. His expertise stems from a successful career with a global fastener manufacturer, building and managing cold forging departments in the UK and North America, and educating operational personnel through the development and implementation of training programs. Derek now also supports the UK fastener manufacturing industry as the fastener sector specialist for the Confederation of British Metalforming.

derek.barnes@coldforgingsolutions.com

CONFEDERATION OF BRITISH METALFORMING

CBM Issues Industry Rallying Call As Climate Change Agreement Scheme Could Offset Rising Energy Costs

Manufacturers could be eligible for a discount of up to 100% of the tax they will be paying on their gas and electricity bills.

Manufacturers of sheet metal components, forgings, fasteners and cold rolled sections can get vital support to help them cope with soaring energy costs according to a leading trade body for the sector.

The Confederation of British Metalforming (CBM) has received notification from the Environment Agency that the Climate Change Agreement scheme has reopened to new entrants, but firms only have until March 31st to stake their claim.

This means thousands of businesses – already struggling with supply chain disruption and the aftermath of the pandemic – could be eligible for a discount of up to 100% of the tax they will be paying on their gas and electricity bills.

Bosses at the CBM made the rallying call today in a bid to raise awareness amongst companies who did not know the change of rules could see them benefit from the discount on the Climate Change Levy whilst the replacement scheme is being consulted on.

“Over the past two years, industry seems to have hurtled from one problem to the next, with our 200-strong membership base struggling with debt carried over from the pandemic, reduced sales due to supply issues and rising costs in all areas,” explained Stephen Morley, President of the CBM.

“The last thing they need now is soaring energy prices, where, in some cases, we’ve seen increases of over 100% – how can any business cope with that? It’s an issue that will be top of my list when I meet with Kwasi Kwarteng MP, Secretary of State for Business, Energy and Industrial Strategy, this week.”

The CBM has administered Climate Change Levy agreements since 2001 and its members have so far benefitted from annual savings of £4m in Climate Change Levy Tax.

Specialists at the organisation work with eligible members to complete all the administration by reviewing bills and completing the application before ongoing annual management with submissions to the Environment Agency.

Geraldine Bolton, CEO of CBM and lead on Energy Services, went on to add: “Industry is recovering and recovering well, but there are plenty of challenges – a lot of which are out of its control.

“Energy costs are at the top of everyone’s agenda at the moment, but outside of fixed price contacts there are few avenues for companies to turn. The Climate Change Agreement Scheme being reopened is an unexpected bonus, yet not many management teams know about it or understand what to do.

“After this window of entry is closed, there will be no more opportunities until March 2025, when we should eventually know what the new scheme will look like.”

She concluded: “By becoming a member and tapping into our offer, manufacturers can also avoid ‘consultants’ who, in some cases, take 50% of the potential savings. Our route is far more cost effective, plus it will also give them access to our other services, including extensive networking and lobbying capabilities.”

please contact Louise.campbell@thecbm.co.uk for further information

PROUD MEMBER OF CBM CONFEDERATION OF BRITISH METALFORMING

ENERGY SAVINGS OPPORTUNITY SCHEME (ESOS) PHASE 3 COMPLIANCE HAS STARTED

The Confederation of British Metalforming is here to guide your company through the audit process with our expert knowledge of your sector

The legislation means all qualifying organisations have to prepare mandatory energy audits and if you know you will qualify for Phase 3 there is no reason why you shouldn’t start doing your energy assessments now, if fact, starting early may exclude you from some of the upcoming changes that may include some level of compulsion to complete identified projects.

The audits identify cost-effective measures to cut energy spending, and phase 3 of the audits must be signed off by a registered assessor and submitted to the Environment Agency by December 5th 2023.

All companies with at least one of their UK group members with 250 employees or more, turnover above 50m euros, or a balance sheet value above 43m euros will be affected, which is likely to be more than 9,000 enterprises across the UK, and will affect 40+ CBM members. Please remember this is based on your organisation group structure. The scheme covers all power and fuel used by a company for industrial processes, building and transport.

Phase 1 has taught us that detailing all energy uses throughout a large business, and calculating means of reducing costs can be complex and time consuming, particularly for those already dealing with Climate Change Levy (CCL), the Carbon Reduction Commitment and the Mandatory Carbon Reporting Systems.

We are now taking bookings to carry out ESOS assessments please contact Louise.campbell@thecbm.co.uk for further information

The importance of your supply chain

Author Control Energy Cost

You may think Net Zero is not important or relevant to you, but your clients who are on the path to 'going green' may not feel the same way. In fact, they could start putting pressure on your business sooner than you think.

For a company, optimising your supply chain for Net Zero can increase efficiency, decrease costs and enhance customer service. It builds your reputation among customers and employees who have rising expectations for sustainable business. It also wins funding support from investors who increasingly demand strong environmental, social and corporate governance.

What is Net Zero?

Net Zero refers to the balance between the volume of greenhouse gas produced and the amount removed from the atmosphere. This balance – Net Zero – will happen when the carbon added to the atmosphere is no more than the amount removed.

Net Zero is the best way to tackle climate change by reducing global warming. Achieving a Net Zero, or close to Net Zero, target is necessary to arrest global warming at 1.5 Celsius. The UK set a target to achieve Net Zero by 2050, which is looking increasingly over-ambitious unless businesses act immediately.

What are scopes 1, 2 and 3 of carbon emissions?

The Greenhouse Gas Protocol is the world's most widely used greenhouse gas accounting standard, with three scopes. Scope 1 covers direct emissions and Scopes 2 and 3 are indirect emissions. Achieving carbon neutral status only covers Scopes 1 and 2.

Scope 1

Scope 1 emissions are direct emissions deriving from company-controlled resources. Emissions are as a direct result of activities such as heating an office, a manufacturing process, or running vehicles. Scope 1 includes all fuels that produce greenhouse gas emissions.

Scope 2

Scope 2 emissions are the indirect emissions created in the production of the energy used by your business, which could be from renewable or fossil fuel-based sources, or a mixture. Scope 2 emissions can be zero if supplied 100% from renewables.

Scope 3

Scope 3 emissions are generally the largest part of an organisation's carbon footprint as they cover a much wider remit within a supply chain, where your business does not own or control those activities. These indirect emissions might include transport, distribution, waste, leased assets, business travel, commuting, purchased goods and services through your supply chain, and water consumption.

Calculating scope 3 emissions can be a complex and detailed task, because of the numerous parties and processes involved, and the results may surprise you. It may be suppliers that have a comparatively minimal financial impact on your business are having the biggest impact on carbon footprint.

Addressing Scope 3 emissions is crucial for achieving supply chain decarbonisation.

The supply chain

Larger companies will start (if they have not already) to put pressure on their whole supply chain to move to Net Zero. This is likely to include a requirement for suppliers to source sustainable energy, be sustainable with water use and find innovative alternatives for raw materials and other inputs.

Your business's scope 1, 2 and 3 emissions make up part of scope 3 emissions for any business that is upstream within your supply chain. They will want to know what actions you are taking and, if they don't like what they hear, may consider alternative suppliers. Ignoring Net Zero will end up costing you customers and that could happen sooner than you think.

From a smaller business perspective, it is easier to deal with your own challenges but more difficult to convince others within your supply chain to follow suit and help you get to Net Zero, as you cannot put the same pressures on them that a larger business can.

We are running supply chain assessments to determine where to switch to alternative suppliers aligned with our Net Zero goal, using certified carbon offsets to bring us to being carbon neutral whilst we work through these challenges.

The key is to do your research. Achieving Net Zero requires coordinated action touching on many parts of an organisation. What may seem overwhelming can be broken down into strategic and controllable steps, starting with analytics, then solutions, and finally implementing change. Achieving Net Zero requires investment and buy-in from all areas of a business and thought needs to go into finding the right ways to achieve it.

CONFEDERATION OF BRITISH METALFORMING

ONLINE VIA ZOOM

METALLURGY FOR NON-METALLURGISTS

TUESDAY 15TH & WEDNESDAY 16TH MARCH 2022

THE METALLURGY FOR NON-METALLURGISTS PROGRAMME IS A TWO DAY COURSE DESIGNED FOR ANYONE WHO NEEDS TO KNOW MORE ABOUT METALS AND PROCESSES USED IN THEIR COMPANY.

The above course dates are provisional.

If you would like to express an interest to attend, please email Melinda Jean, melinda.jean@thecbm.co.uk

OUTLINE OF COURSE CONTENTS

- Metal properties
- Metals structure
- Ore smelting
- Metals making & casting
- Rolling and metal forming
- Mechanical Testing and NDT
- Hot & cold working/shaping/forming
- Heat treatment
- Metal alloy classification
- Corrosion

BUSINESS BENEFITS

The Metallurgy for Non-Metallurgists programme will enable participants to:

- communicate more effectively with technical colleagues
- be better informed and more efficient when dealing with customer enquiries
- avoid mistakes caused by lack of understanding
- understand the production, processing and testing of relevant metals and alloys
- appreciate the properties and applications of relevant industrial alloys

PROGRAMME CONTENT

Courses commence with delivery of core knowledge components and progress onto a series of extended knowledge modules.

PROGRAMME DELIVERY

Courses take the form of participative workshops, led by an expert metallurgist with extensive metals industry experience.

The content, length and structure of the course can vary according to individual company needs.

A folder of course materials is supplied and all attendees will receive a certificate after completing the two day course.

COST

CBM members £325 + vat per person,
Non Members £445 + vat per person

Places are limited, so to avoid disappointment reserve your place(s) now contact: Melinda Jean at the CBM on 0121 601 6350 or email: melinda.jean@thecbm.co.uk

NATIONAL METALFORMING CENTRE,
WEST BROMWICH, WEST MIDLANDS B70 6PY

Manufacturer & Supplier Membership Directory 2021

Fastener

A.M.C. UK Fasteners Ltd — **t: 01536 271 920**
West Midlands NN17 5XZ — **www.amcukfasteners.co.uk**

Atlas Copco IAS UK Ltd (Henrob) — **t: 01244 837 220**
Flintshire CH5 2NX — **www.henrob.com**

Barton Cold-Form, an Optimas Company — **t: 01905 772 021**
Worcestershire WR9 0LP — **www.global.optimas.com**

Brooks Forgings Ltd
West Midlands B64 5QJ

Established in 1960, one of the UK's leading manufacturers of forged and machined components. With our extensive in house manufacturing capabilities we are able to produce standards and specials to suit customer specific requirements.

t: 01384 563 356
f: 01384 563 357
e: enquiries@brooksforgings.co.uk
www.brooksforgings.co.uk

Cirteq Ltd — **t: 01535 633 333**
West Yorkshire BD20 8QP — **www.cirteq.com**

Clevedon Fasteners Ltd
West Midlands B75 7DG

West Midlands based UK manufacturers of fasteners and customer specific. Specialists cold forgings. ISO9001 and ISO14001 approved, Covid Secure.

t: 0121 378 0619
f: 0121 378 3186
e: sales@clevedon-fasteners.co.uk
www.clevedon-fasteners.co.uk

Complex Cold Forming Ltd — **t: 0121 556 5700**
West Midlands WS10 7SE — **www.complexcoldforming.com**

Cooper & Turner Ltd — **t: 01142 560 057**
Yorkshire S9 1RS — **www.cooperandturner.co.uk**

Howmet Fastening Systems and Rings, Redditch Operations (Linread Ltd) — **t: 01527 525 719**
Worcestershire B98 7TD — **www.howmet.com**

Howmet Fastening Systems Telford — **t: 01952 290 911**
Shropshire TF3 3BQ — **www.howmet.com**

JCS Hi-Torque Ltd — **t: 01787 376 212**
Suffolk CO10 2YH — **www.jcshi-torque.co.uk**

Leggett & Platt Components Europe Ltd — **t: 01282 814 054**
Lancashire BB18 6JA — **www.leggett.com**

Leggett & Platt Components Europe Ltd — **t: 01226 707 500**
South Yorkshire S72 7GH — **www.leggett.com**

Smith Bullough — **t: 01942 520 250**
Lancashire WN2 4HD — **www.smithbullough.com**

SPS Technologies (T.J. Brooks Div.) — **t: 0116 274 4886**
Leicestershire LE4 9HX — **www.spstech.com**

Stanley Engineered Fastening (Avdel) — **t: 01925 811 243**
Cheshire WA1 4RF — **www.stanleyengineeredfastening.com**

TR Fastenings — **t: 0845 4811 800**
East Sussex TN22 1QW — **www.trfastenings.com**

Forging

Abbey Forged Products Ltd — **t: 0114 231 2271**
Yorkshire S6 1ND — **www.abbeyforgedproducts.co.uk**

AKS Precision Ball Europe Ltd — **t: 0191 587 0000**
County Durham SR8 2PP — **www.aksball.com**

Bedford Steels — **t: 01246 299 100**
Yorkshire S4 7YS — **www.bedfordsteels.co.uk**

Bifrangi UK Ltd — **t: 01522 585 800**
Lincolnshire LN2 5DT — **www.bifrangi.co.uk**

Blaenavon Forgings Ltd — **t: 01495 790 345**
Gwent NP4 9XG — **www.forgedsolutionsgroup.com**

Brockhouse Group Ltd — **t: 0121 556 1241**
West Midlands B70 0SN — **www.brockhouse.co.uk**

Brookes & Adams Ltd — **t: 0121 360 1588**
West Midlands B44 9DX — **www.banda.co.uk**

Brooks Forgings Ltd
West Midlands B64 5QJ

Established in 1960, one of the UK's leading manufacturers of forged and machined components. With our extensive in house manufacturing capabilities we are able to produce standards and specials to suit customer specific requirements.

t: 01384 563 356
f: 01384 563 357
e: enquiries@brooksforgings.co.uk
www.brooksforgings.co.uk

Cascade (UK) Ltd — **t: 0161 438 4010**
Greater Manchester M11 2DD — **www.cascorp.com**

Cerro EMS Ltd — **t: 0121 772 6515**
West Midlands B9 4DS — **www.cerro-ems.com**

Chapmans Agricultural Ltd — **t: 0114 285 6000**
South Yorkshire S6 2FH — **www.chapmans-uk.com**

Cramlington Precision Forge Ltd — **t: 01670 716 811**
Northumberland NE23 1WA — **www.cpfl-tvs.com**

Footprint Sheffield Ltd — **t: 0114 232 7080**
South Yorkshire S6 2AH — **www.footprint-tools.co.uk**

Henry Williams Ltd — **t: 01325 462 722**
County Durham DL1 2NJ — **www.hwilliams.co.uk**

International Safety Components — **: 01248 363 110**
LLandegal LL57 4YH — **www.iscwales.com**

Independent Forgings & Alloys Ltd — **t: 0114 234 3000**
South Yorkshire S6 2BL — **www.independentforgings.com**

Kimber — **t: 01384 414 500**
West Midlands B64 5QY — **www.kimbermills.co.uk**

Koyo Bearings (Europe) Ltd — **t: 01226 733 200**
South Yorkshire S75 3TA — **www.koyo.eu**

Mettis Group Ltd — **t: 01527 406 400**
Worcestershire B97 6EF — **www.mettis-aerospace.com**

Mills Forgings Ltd — **t: 024 7622 4985**
Warwickshire CV1 2BJ — **www.millsforgings.co.uk**

MSI-Forging Division — **t: 01302 366 961**
South Yorkshire DN4 8DH — **www.msi-forge.com**

Padley & Venables Ltd — **t: 01246 299 100**
Yorkshire S18 2XT — **www.padley-venables.com**

Pandrol UK Ltd t: 01909 476 101
Nottinghamshire S81 7AX www.pandrol.com

Smith Bullough t: 01942 520 250
Lancashire WN2 4HD www.smithbullough.com

Solid Swivel Ltd t: 01384 636 421
West Midlands B64 7BL www.solidswivel.co.uk

Somers Forge Ltd t: 0121 585 5959
West Midlands B62 8DZ www.somersforge.com

Special Quality Alloys Ltd t: 0114 243 4366
Yorkshire S9 3XN www.specialqualityalloys.com

Spromak Ltd t: 0151 480 0592
Merseyside L36 6AN www.spromak.co.uk

Tecomet t: 0114 285 5881
Yorkshire S6 2AN www.symmetrymedical.com

The Crosby Group UK Limited
West Midlands B64 6AJ

The Crosby Group is a global leader in innovating, developing, manufacturing and supplying products used in lifting, rigging, load monitoring, material handling and other related applications.

t: 01384 353 120
www.premierstampings.co.uk

Tinsley Bridge Group t: 0114 2211 111
Yorkshire S9 1TG www.tinsleybridge.co.uk

W.H. Tildesley Ltd t: 01902 366 440
West Midlands WV13 2AN www.whtildesley.com

Wyman Gordon Lincoln Ltd t: 01522 525 492
Lincolnshire LN2 5XY www.wyman-gordon.com

Wyman Gordon Ltd t: 01506 446 200
West Lothian EH54 5BZ www.wyman-gordon.com

Sheet Metal / Pressing

AGA Rangemaster Ltd t: 01926 457 400
Warwickshire CV31 2AD www.rangemaster.co.uk

Aisin Europe Manufacturing (UK) Ltd t: 0121 421 5688
West Midlands B32 3BZ www.aisin.com

APS Metal Pressings Ltd
West Midlands B19 3AR

- APS are a world leading manufacturer, with unrivalled metal forming and presswork capabilities.
- Our 57,000 square foot facility contains the latest start-of-the-art manufacturing plant enabling us to provide, complex high specification components.
- Founded in 1970, this family run business, is based within the hub of British industry – Birmingham, the home of the Enviro-Cup.

t: 0121 523 0011
f: 0121 554 7244
e: info@apsmith.co.uk
www.apsmith.co.uk

Bisley (FC Brown) t: 01633 637 383
Gwent NP19 4PW www.bisley.com

Broadways Stampings Ltd t: 01908 279 200
Buckinghamshire MK1 1DT www.broadwaysstampings.co.uk

C.Brandauer & Company Ltd t: 0121 359 2822
West Midlands B19 2YU www.brandauer.co.uk

Carlton Laser Services Ltd t: 0116 233 9990
Leicestershire LE4 9LN www.carltonlaser.co.uk

Cirteq Ltd t: 01535 633 333
West Yorkshire BD20 8QP www.cirteq.com

Denso Marston Ltd t: 01274 702 404
Yorkshire BD17 7JR www.denso-europe.com

Eaton Group t: 01795 889 146
Kent ME12 1LP www.enclosures-crouse-hinds.uk.com

Eden - A trading division of The Marmon Group Limited t: 01933 401 555
Northamptonshire NN8 6GR www.eden-uk.com

Eu-Matic Div. of Multimatic Ltd t: 024 7667 3333
Warwickshire CV5 6UB www.multimatic.com

European Springs & Pressings (Beckenham) t: 0208 663 1800
Kent BR3 4DW www.europeansprings.com

Ex-pressed Steel Panels LTD t: 01535 632 721
North Yorkshire BD22 0DB www.steelpanels.com

Futaba-Tenneco UK Ltd t: 01282 433 171
Lancashire BB12 6HJ www.futaba-tenneco.co.uk

G John Power Limited t: 0121 550 3112
West Midlands B63 3PF www.gjohnpower.co.uk

G-TEKT Europe Manufacturing (Gloucester) t: 01452 610 022
Gloucestershire GL3 4AJ www.takao.co.uk

G-TEKT Europe Manufacturing Ltd (Gwent) t: 01495 307 190
Gwent NP23 5SD www.takao.co.uk

GDC Group Ltd (Newry) t: 02830 264 621
County Down BT34 2QU www.gdcgroup.co.uk

GDC Group Ltd (Portadown) t: 0283 8333 131
County Armagh BT63 5HU www.gdcgroup.co.uk

Gestamp Tallent Ltd (Aycliffe) t: 01325 313 232
County Durham DL5 6EP www.gestamp.com

Gestamp Tallent Ltd (Cannock) t: 01543 466 664
Staffordshire WS11 1LY www.gestamp.com

Gestamp Tallent Ltd (Llanelli) t: 01554 772 233
Carmarthenshire SA14 8EU www.gestamp.com

Glen Dimplex Home Appliances t: 0844 248 4466
Merseyside L35 2XW www.gdha.com

Guala Closures UK Ltd t: 0141 777 2000
Lanarkshire G66 1ST www.gualaclosures.com

Hadley Industries Plc t: 0121 555 1300
West Midlands B66 2PA www.hadleygroup.com

Imperial Machine Company t: 01978 661 155
Wrexham LL13 9RF www.imco.co.uk

JCS Hi-Torque Ltd t: 01787 376 212
Suffolk CO10 2YH www.jcshi-torque.co.uk

Kiyokuni Europe Ltd t: 01952 292 920
Shropshire TF2 9TY www.kiyokuni.co.uk

KMF (Precision Sheet Metal) Ltd t: 01782 569 060
Staffordshire ST5 7UF www.kmf.co.uk

Leonardt Limited t: 01746 861 203
Shropshire WV16 6NN www.leonardt.com

Liberty Pressing Solutions (Coventry) Ltd t: 02476 691 000
West Midlands CV5 6RT www.libertyhousegroup.com

Lincat t: 01522 875 500
Lincoln LN6 3QZ www.lincat.co.uk

Milton Keynes Pressings Ltd
Buckinghamshire MK2 3EF

The MKP Group consists of Milton Keynes Pressings, Ryeland Toolmakers and Maine office, all established Engineering Companies. As a tier one supplier of Metal pressings and sub assemblies in to the automotive and other industries we pride ourselves on our quality and delivery performance to our customers of which we have received various awards.

Our Accreditations include:

bsi. ISO 9001 Quality Management | ISO 14001 Environmental Management | OHSAS 18001 Occupational Health & Safety Management | TS 16949 Automotive Quality Management

VDA 6.3

t: +44 (0) 1908 271 940
www.mkp.co.uk

Northern Automotive Systems Ltd t: 01873 832 263
Monmouthshire NP7 0EB www.nasuk.com

Presspart Manufacturing Ltd t: 01254 584 126
Lancashire BB1 5RF www.presspart.com

Radius Aerospace Inc t: 01743 454 300
Sheffield S20 3GB radiusaerospace.com

Rical Limited t: 0121 558 2694
West Midlands B66 1NY www.ricalgroup.com

Rittal-CSM Ltd t: 01752 207 600
Devon PL6 7EZ www.rittal-csm.co.uk

SDE Technology
Shropshire SY1 3LB

- SDE Technology is a long standing metal presswork and assemblies provider based in Shrewsbury.
- With mechanical, progression, hydraulic and transfer options up to 1000T, and incorporating 2 state of the art Powder coating lines on site.
- We are here for all your pressing and coating needs.

t: 01743 450 501
www.sde.technology.co.uk

Sertec Aluminium Structures t: 0121 706 0330
West Midlands B11 2BF www.sertec.co.uk

Sertec Auto Structures Heavy Stamping t: 01675 463 361
West Midlands B46 1JX www.sertec.co.uk

Sertec Light Stampings t: 0121 327 1428/ 01675 436 000
West Midlands B6 7QT www.sertec.co.uk

SPS Aerostructures Ltd t: 0115 988 0000
Nottinghamshire NE15 0DP www.spstech.com

Steel & Alloy Processing Ltd t: 0121 553 5292
West Midlands B70 6BZ www.steelalloy.co.uk

Stockfield Metal Spinners Ltd t: 0121 440 1333
West Midlands B12 9DJ www.stockfield.com

Swann-Morton Ltd t: 0114 234 4231
Yorkshire S6 2BJ www.swann-morton.com

The Regent Engineering Co (Walsall) Ltd t: 0121 526 6060
West Midlands WS10 8XB www.regenteng.com

Titan Steel Wheels t: 01562 850 561
West Midlands DY10 3SD www.titansteelwheels.com

Voestalpine Metsec plc t: 0121 601 6000
West Midlands B69 4HF www.metsec.com

Voestalpine Rotec Ltd t: 01455 620 300
Leicestershire LE10 3BS www.voestalpine.com/rotec

Walsall Pressings Co Ltd t: 01922 721 152
West Midlands WS1 4JW www.walpres.co.uk

Whittan Storage t: 0800 169 5151
Shropshire TF7 4LN www.link51.co.uk

William King Ltd t: 0121 500 4100
West Midlands B70 9DR www.williamking.co.uk

Cold Rolled

Aisin Europe Manufacturing (UK) Ltd t: 0121 421 5688
West Midlands B32 3BZ www.aisin.com

Grove Metal Sections Ltd t: 01902 601 697
West Midlands WV13 3RN www.grovems.com

Hadley Industries Plc t: 0121 555 1300
West Midlands B66 2PA www.hadleygroup.com

Voestalpine Metsec plc t: 0121 601 6000
West Midlands B69 4HF www.metsec.com

Fastener

Ajax Tocco International Ltd — **t: 0121 322 8000**
West Midlands B8 1BG — **www.ajaxtocco.co.uk**

Carlo Salvi UK Ltd - Hatebur — **t: 01952 587 730**
Shropshire TF7 4PF — **www.carlosalvi.com**

Doerken MKS Systeme Gmbh and Co — **t: 00 49 233 0630**
Germany — **www.doerken.com**

Heat Treatment 2000 Ltd — **t: 0121 526 2000**
West Midlands B70 9PQ — **www.heattreat2000.co.uk**

National Machinery UK Ltd — **t: 0121 222 5352**
West Midlands B31 2TS — **www.nationalmachinery.eu**

Phillips Screw Company — **t: 0754 081 1962**
Leicestershire LE3 2YB — **www.phillips-screw.com**

RLS Tooling — **t: 01543 271 808**
Staffordshire WS11 9PU — **www.rlstooling.co.uk**

Forging

Ajax Tocco International Ltd — **t: 0121 322 8000**
West Midlands B8 1BG — **www.ajaxtocco.co.uk**

Bharat Forge — **t: 01562 720 396**
Middlesex TW8 9JJ — **www.bharatforge.com**

Carlo Salvi UK Ltd - Hatebur — **t: 01952 587 730**
Shropshire TF7 4PF — **www.carlosalvi.com**

Condat Ltd — **t: 01302 770 088**
Doncaster, DN 10 6EZ — **www.condat-lubricants.com**

Dreher Automation — **t: 0049 7454 881 640**
Germany D- 72172 — **www.dreher.de**

Forge Tech Services (UK) Ltd
West Midlands B71 3QW

- Spares, Service and Process engineering for all makes of metalforming equipment
- Forge Tech offer a full Turnkey service for all your metalforming equipment projects from small spares to complete press installations.

t: 07789 502 850
www.forgetechservices.com

Henkel Ltd — **t: 01442 278 000**
Hertfordshire HP2 4RQ — **www.henkel.com**

Interpower Induction Ltd — **t: 01675 477 700**
West Midlands WS8 6LH — **www.interpowereurope.com**

James Durrans and Sons
Yorkshire S36 9QU

- Suppliers of all types of forging lubricants
- UK based manufacturing facilities and technical support
- 10 day delivery time on most lubricants

Contact:
Steven Sherry, Sales Manager — **t: 01226 370 000**
www.durrans.co.uk

LASCO Umformtechnik GmbH — **t: 00 49 9561 6420**
Germany — **www.lasco.com**

Micas Simulations Ltd — **t: 01865 775 412**
Oxfordshire OX4 2ER — **www.micassimulations.co.uk**

Sheet Metal / Pressing

Aalberts Surface Technologies Ltd — **t: 0121 327 2020**
West Midlands B6 7EE — **www.hauckht.co.uk**

AP&T UK — **t: 00 45 762 53201**
Denmark — **www.aptgroup.com**

Dayton Progress Ltd — **t: 01926 484 192**
Warwickshire CV8 1NP — **www.daytonprogress.co.uk**

Dreher Automation — **t: 00 49 7454 881 640**
Germany D-72172 — **www.dreher.de**

EcoCooling Limited — **t: 07973 287 385**
Suffolk IP28 6RE — **www.ecocooling.org**

Institute of Sheet Metal Engineering — **t: 0789 149 9146**
West Midlands WV6 7UQ — **www.isme.btck.co.uk**

MISATI S.L. — **t: +34934 404 727**
Spain — **www.misati.com**

Ryeland Toolmakers — **t: 01908 647 746**
Buckinghamshire MK2 3JJ — **www.ryelandtoolmakers.co.uk**

The Bifurcated & Tubular Rivet Company — **t: 01296 314 300**
Buckinghamshire HP20 1DQ — **www.bifandtub.co.uk**

Commercial

Advanced Forming Research Centre — **t: 0141 534 5200**
Renfrew PA4 9LJ — **www.strath.ac.uk/afrc**

Altair Engineering — **t: 01926 468 600**
Warwickshire CV32 4JG — **www.altairengineering.co.uk**

Control Energy Costs Ltd — **t: 07501 221 728**
Surrey CR5 1BN — **www.cec.uk.com**

Crowe U.K. LLP — **t: 0121 543 1900**
West Midlands B69 2DG — **www.crowe.co.uk**

FBC Manby Bowdler Solicitors LLP — **t: 01902 578 000**
West Midlands WV2 4DN — **www.fbcmb.co.uk**

Fortress Interlocks — **t: 01902 349 000**
West Midlands, WV4 8FB — **www.fortressinterlocks.com**

Fuchs Lubricants (UK) Ltd — **t: 01782 203 700**
Staffordshire ST1 5HU — **www.fuchs.com/uk**

Gravity Risk Services — **t: 07510 695 335**
Leicestershire LE7 1GP — **www.gravityriskservices.co.uk**

Highley Steel Ltd — **t: 01384 396 660**
West Midlands DY8 1JN — **www.highleysteel.com**

Imperial College London — **t: 020 7589 5111**
London SW7 2A8 — **www.imperial.ac.uk**

In-comm Training and Business Services Ltd — **t: 01922 457 686**
West Midlands WS9 8UG — **www.in-comm.co.uk**

Inspired Energy Plc — **t: 01772 689 250**
Lancashire PR4 2TZ — **www.inspiredenergy.co.uk**

Kumi Solutions — **t: 02746 350 360**
Warwickshire CV8 9FF — **www.kumi-solutions.com**

Lake Engineering Solutions Worcestershire B98 8QJ	**t: 07948 352 008** **www.lakecm.co.uk**
Petrofer UK PLC Shropshire TF7 4PW	**t: 01952 580 100** **www.petrofer.co.uk**
Powerstar South Yorkshire S35 1QP	**t: 0333 230 1327** **www.powerstar.com**
Process Parameters Ltd Berkshire SL6 3UA	**t: 01628 778688** **www.processparameters.co.uk**
R & D Tax Claims Ltd Shrewsbury SY4 4FA	**t: 0845 003 0140** **www.rdtaxclaims.co.uk**
Regenerco Limited Burton Upon Trent DE13 9PD	**t: 07973 298 832** **www.regenercoenergy.com**
ReTell Middlesex TW16 5QH	**t: 01932 730 890** **www.retell.co.uk**
Sammet Consulting Birmingham	**t: 07885 489 176** **www.linkedin.com/stuart-mellor-sammet**
Total UK Ltd West Yorkshire WF11 8JY	**t: 01977 636 303** **www.total.co.uk**

manufacturing + engineering week

NEC BIRMINGHAM | 6-10 JUNE 2022

Celebrating the best in UK manufacturing and engineering excellence and innovation.

What's on

6-7 June - Virtual Event Programme

8-9 June - Live Event Programme

10 June - Round up and Key Takeaways

- **Hear inspiring keynotes, exclusive interviews and debates**
- **Attend CPD accredited workshops**
- **Source products and services from Britain's best suppliers**

Premier Partners

WÜRTH igus Farnell

Innovation Zone Sponsor

ARROW

Keynote Theatre Sponsor

ABB

manufacturing + engineering week NEC BIRMINGHAM | 6-10 JUNE 2022 / Incorporating design engineering expo / engineering expo / manufacturing expo / maintec

Find out more at www.mandeweek.co.uk

@MandEWeek

EXHIBIT AT MACH 2022

THE UK'S NATIONAL EVENT FOR INSPIRING, INNOVATING AND CONNECTING MANUFACTURING

Taking place from **4-8 April 2022,** MACH will be the event to connect the world of manufacturing technologies and be the destination of choice for manufacturing engineers, decision makers, buyers and specifiers looking to discover new technology, adopt and invest in the digital revolution.

TO BOOK YOUR SPACE AT MACH 2022 VISIT
machexhibition.com

Organised by

MTA
THE MANUFACTURING TECHNOLOGIES ASSOCIATION

Sponsored by

LLOYDS BANK

MACH 2022
4-8 April
NEC Birmingham UK
machexhibition.com