

THE PARTNERSHIP PRINCIPLE



Steve Hackett, Engineering/Technical Consultant

ISMR SAYS:

"Whiston Industries uses AutoForm software on all its toolmaking and die-design projects"

ISMR visited UK toolmaker, Whiston Industries, which has over fifty years of press tooling experience.



Whiston Engineering

Whiston Industries is a well-known UK press tool manufacturer and subcontract machining specialist, supplying global automotive, aerospace, medical, energy and marine industries. It also manufactures transfer dies; progressive dies as well as stamping tools and dies; and offers a tool repair and die change service.

The company supplies tooling for a wide range of automotive Body in White (BiW) components including major structural, chassis and class A skin panels for low-volume and high-volume production requirements. It works with a wide range of materials, including high-strength steel and aluminium components, manufacturing around 80 dies per year across the automotive sector.

It has over 50 years of experience in automotive and aerospace press tool manufacture. With worldwide automotive OEM and Tier- One customers which include Jaguar Land Rover; Range Rover; Bentley; Aston Martin; STADCO; VW; Rolls Royce; MG Rover; Audi; Ford Trucks; PACCAR Trucks; BMW and Mercedes, it invited ISMR to its facility in Cradley Heath, near Birmingham, to view the plant and see the latest iteration of its AutoForm software in action. It has

forged a strong partnership with the software specialist for continuous quality improvement, improved efficiencies and reduced costs (with a goal of no recuts after simulation).

“The company supplies tooling for a wide range of automotive Body in White (BiW) components”

Engineering and press forming simulation

"We were the first UK toolmaker to use CAD and, off the back of that, to start CNC machining. This enabled us to expand rapidly in the 1980s, particularly when we invested in large tryout presses which helped us to manufacture large tandem dies. We are





Hand polishing dies at Whiston Industries

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one of the few toolmakers left in the UK who can make very large dies. We are Q1 status at Ford and, I believe, at that point were the only toolmaker in Europe to hold this status at Ford,” explained Steve Hackett, Engineering/ Technical Consultant.

The company embraces process simulation software and tooling experience to develop advance process and design criteria early in the tooling production cycle. This ensures maximum productivity and accuracy of the final component, together with virtual die face proving and blank development prediction.

Utilising advanced incremental simulation technology and accurate interpretation of the forming limit diagram, Whiston engineers predict common sheet metal and sheet aluminium defects including wrinkles, splits, excessive thinning, excessive thickening and springback. It has, for many years, relied on AutoForm software to help with this, as well as for tool and die design. The software is compatible with Whiston customer raw data, including Catia, Ideas, Powershape, Unigraphics, AutoCad, IGES, VDA and DXF.

“We use AutoForm software on every single project we do from conception (feasibility data, using DieDesigner for blankholder and addendum shape) to inspection of the die. We start focusing very early on springback issues because the part must be 100% inside tolerance. The software will highlight any springback issues early in the project so that we can talk to a customer about perhaps changing the fixturing, assembly or clamping strategy or shifting the tolerances. We always model the tooling surfaces exactly as the die will be

manufactured. Every detail must be modelled, such as increases in gas- pressures, draw beads. What you run in your simulation must mimic, as closely as possible, what you are going to manufacture. That way, you get correlation.... and there must always be correlation. The output we see on AutoForm software (the digital master) must match what we see in reality,” added Hackett.

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“This also increases die quality and saves us money, as we rarely have to recut draw dies. You need to minimise springback as well as consider what the follow-on dies will do after the first forming operation i.e. how that part is going to sit on those dies. So, when you make a drawn shell (before it is trimmed and becomes a finished part), we need to decide whether we will compensate for our first trim from the digital AutoForm model (which we do in many cases, if the springback is low). If there is a lot of springback, we may need to think about making drawn shells and scanning the part. The die manufacture must be of high enough quality to duplicate this quality and performance across several dies. We are really happy with AutoForm software – we use its DieDesigner, Trim and Sigma modules. We are also looking at using its hemming software in the future.”

Meeting new challenges

All tooling is fully constructed by Whiston Industries' CAD team, to the agreed tooling standards, before die manufacture. Full 3D machining cutter paths are then produced to the optimum cutting strategies.

“We apply the 1/10/100 rule in toolmaking; it costs you £1 in simulation, £10 in design and £100 when the die is finished”

Traditional and modern methods of die construction include gas spring, manifolds etc. Whiston's tool try-out operations incorporate large capacity try-out presses, of up to five metres (197”), in both hydraulic and mechanical formats, according to customer requirements. Sample components are also produced to customer requirements.



Stamped parts

In accordance with the increasing trend towards vehicle lightweighting, Hackett has noticed more aluminium creeping into die design. Around 70% of the parts he sees now are made from aluminium which, he says, also displays greater springback than steel.

“Toolmaking is constant problem-solving. Everything that you make is bespoke, a one-off. The forming software is the virtual tryout. We apply the 1/10/100 rule in toolmaking; it costs you £1 in simulation, £10 in design and £100 when the die is finished,” he told *ISMR*.



Steve Hackett with a perforated part

FACE TO FACE

"We have been using AutoForm simulation software successfully for many years. The time that we saved in the process by using this software meant that we could do more simulations – so the result was far more accurate because you could do more iterations and did not run out of time. Time is the enemy of the toolmaker – there is never enough of it. Priorities for us are speed, accuracy, ease of use, cost savings and overall efficiency. There should be no issues in tryout, if the simulation set-up has been done correctly. There has been a massive improvement in the process from ten years ago. Historically, you would have to get your draw-surfaces down and sort out everything else in tryout. Now, simulation time has increased but tryout time has reduced considerably (which has substantially reduced the costs)."

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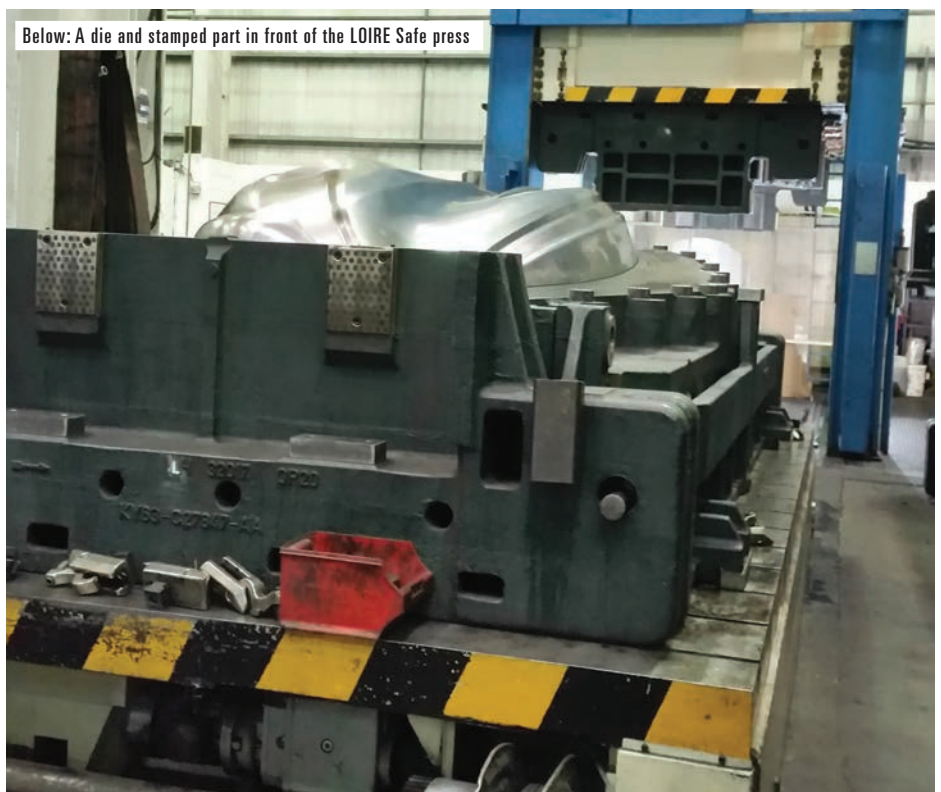
One example he cited was the new Range-Rover VELAR project, where Whiston Industries is supplying the dies for nine parts. It uses AutoForm-DieDesigner software to produce the tandem and transfer tooling, made mostly in aluminium, for this project. The dies are delivered to its Tier 1 customer, Stadco, for this project.

"On the VELAR project, we had to make dies for nine parts and, for eight out of the nine, we did not have to do a single recut. The customer gave us its CAD data and we had to adhere to a set of standards (such as trim angles, blankholder set-up etc.). We then started the feasibility work. On the Range-Rover project, springback issues occurred and were engineered out in the simulation using AutoForm software and CAD. We constantly liaised with the customer all the way through the process and each milestone/gateway. In terms of standard dimensional accuracy, each OEM is different. It also depends upon the material (steel or aluminium). Tolerances can range from +/- .8 to +/- .3mm. The Range-Rover VELAR project tolerance was +/- .8mm," he told *ISMR*.

“Simulation can also help to solve or engineer out cosmetic defect and skin surface quality issues.”



The dies and stamped parts that have come off the press



Below: A die and stamped part in front of the LOIRE Safe press



Steve Hackett demonstrates AutoForm simulation software



A part undergoes inspection at Whiston Industries

Simulation can also help to solve or engineer out cosmetic defect and skin surface quality issues. Standards are becoming stricter on this and a tool cannot be sold if a panel has a ripple in it. This can drive quite significant changes in forming techniques. Cosmetic issues are also, as Hackett pointed out, almost impossible to fix once the part has been stamped. It therefore uses AutoForm software to predict defects and correct them at the engineering stage.

Another test of Whiston's toolmaking ingenuity was the project diemaking for the Aston Martin DB11 hood (inner and outer) and doors.



Steve Hackett demonstrates the new CMM machine at Whiston Industries

"The hood was the largest cold pressed hood ever made. The doors were the deepest doors ever made. The die for the hood outer did not even fit the production press, it was so large... We had to do a lot of clever stuff with the die design. For the initial feasibility work, the first thing I had to do was engineer all the draw surfaces to suit the massive blank size. It was quite a challenge...", explained Hackett.

"The AutoForm team has been brilliant, helping us out with obscure problems that we sometimes encounter. In terms of simulations per part, this can range from 12 to 100 plus (depending upon the part). Each manufacturing process design is a little tweak with the aim

of the perfect manufacturing process design at the end. A good percentage of that may be changes from the OEM, who may have changed a hole or modified a trim line during the process."

The new Aston Martin Vantage has just been released, and Whiston Industries is manufacturing dies for the doors, bonnet (aluminium), roof and body side (steel) of this new model. The body side was a real challenge... the shape is very deep. But AutoForm simulation software has helped it to produce the die for this, a testament to the size and complexity of the skin panels.

Repeatability, also called robustness (taken care of with AutoForm-Sigma software) can also be an issue – it is important that repeatability can be guaranteed across volume parts, minimising scrap levels. It is an area that AutoForm has worked on with Whiston for over four years. AutoForm has just released new software called TryoutAssistant, with this in mind, which tells a user what to physically change on a die to bring it back to the simulation digital master (by adjusting draw beads etc.).

An eye on 2018

"2017 has been a great year for us and our turnover has substantially increased. In fact, the last four years have been very busy for us. The



A perforated panel made by sister company, Formtex, for ATOL (a shopping centre in France) using AutoForm software

drop in the pound has helped our exports. We are optimistic for next year, with work on the books now until the start of 2019 (for one particular project). We are looking at how to streamline the manufacturing side of things and become more efficient, with a drive towards continuous improvement and quality," Hackett told *ISMR*.

Whiston Industries has also been making some significant equipment purchases, with two new Fagor presses, new milling machining centres and a new CMM machine recently installed.

"We purchased a new 5-axis milling machining centre (3m x 8m bed) which will be installed in January 2018. We recently installed a large Zimmerman 5-axis milling machine (18 months ago) and bought and installed a huge new CMM machine recently. We tend to buy second-hand machines to avoid depreciation issues. We have plans to buy some smaller 5-axis milling machines for the smaller components on the die. We have 2 x 1200-ton LOIRE Safe hydraulic presses and a 350-ton mechanical press onsite. We installed 2 x 800-ton Fagor presses 18 months ago. These are predominantly for tryout. We would like to do more low-volume subcontract production. There is more scope for this, I feel, and more low-volume work out there."

With its access on continuous improvement and quality as well as its strong heritage and toolmaking expertise, Whiston Industries relies on AutoForm as its simulation software partner for current and future diemaking projects. ■

CONTACT

For further details, see
<http://whistonindustries.com> or
www.autoform.com