

techniques through a program of testing, research and quality assurance.

'The fundamental research work we conduct gives a strong underpinning to development activities that are closer to ap-

plication providing insights into the process that increase confidence in its capabilities,' said professor of metallurgy and materials processing and a director of the Mercury Centre, Iain Todd. 'That the activity we ini-

tiated here has facilitated this huge step forward in additive manufacture is a wonderful thing to see.'

Mercury Centre; www.mercurycentre.org

Proto Labs wins award for innovation

MIM and 3D printed prototype manufacturer Proto Labs Inc has been awarded a 2015 Manufacturing Leadership Award by corporate growth consulting firm Frost & Sullivan.

Proto Labs was recognized in the Innovation Process Leadership category for its Cool Idea! Award program, which provides free

prototyping and short-run production services to entrepreneurs.

Innovative manufacturing

'With Cool Idea!, we have the enviable task of working with product designers, engineers and inventors during the infancy of innovation, when their ideas are just

beginning to take shape in early prototype form,' said Vicki Holt, Proto Labs' president and CEO. 'It's extremely fulfilling to then watch these prototypes become actual products that are released to market with the help of our own innovative manufacturing processes.'

Proto Labs; www.protolabs.com

Materialise dips toe in metal 3D printing

Materialise NV, a provider of additive manufacturing software and 3D printing services for plastics, plans to start offering aluminum to its industrial customers.

Materialise CEO Fried Vancraen announced AlSi10Mg as the first metal option to join a range of more than twenty 3D printing polymers currently available.

'We believe that offering aluminum alongside a wide range of polymers allows

us to be of better service to our customers,' said Jurgen Laudus, director additive manufacturing solutions at Materialise. 'Aluminum is a perfect addition to the plastic materials we already offer and it opens doors for new applications.'

Low weight

AlSi10Mg is an alloy that combines good strength and thermal properties with

low weight and flexible post-processing possibilities. It is often used material in automotive, aerospace and automation. Applications include housings, ductwork, engine parts, production tools and molds, both for prototyping and manufacturing purposes.

Materialise NV; www.manufacturing-materialise.com

Lawrence Livermore and GE to develop algorithms for 3D printing

General Electric and Lawrence Livermore National Laboratory (LLNL) have received US\$540,000 from America Makes to develop open-source algorithms that will improve additive manufacturing of metal parts.

The project intends to develop and demonstrate software algorithms that will allow selective laser melting (SLM) to produce metal parts that are high quality and durable. Currently, there is no common approach to SLM that comprehensively reduces problems associated with this method such as surface roughness, residual stress, porosity and micro-cracking. Without careful optimization of the process, these issues may cause parts to fail.

'With the SLM processes in place now, you don't always end up with a part that is structurally sound,' said Ibo Matthews, a researcher with LLNL's Accelerated Certification of Additively Manufactured Metals Strategic Initiative team who is leading the Lab's effort on the joint project. 'It's critical to have mechanically robust parts, especial-



Lawrence Livermore National Laboratory researchers examine a 3D-printed part using the selective laser melting process. Photo by Julie Russell/LLNL.

ly for applications in industries such as aerospace and energy, where part failure could lead to major problems.'

Error issues

In order to print a 3D part using the SLM process, the user must enter data into the

printer using a stereolithography (STL) file, which is a digitized 3D representation of the desired build.

'Ideally, you would send the STL file to an arbitrary 3D printer and it will print out parts that are consistent in terms of dimensions and material properties', said Matthews. 'Currently, that doesn't happen.'

This is because errors appear during the initial translation of the STL file, requiring the user to fill in missing information as well as specify the type of powder material used. To further complicate matters, traditional printer designs treat every layer of powder the same, without giving consideration to the thermal properties of the powder. Some printer systems provide more control than others.

In an ideal system, different layers would demand different laser scanning speeds and powers because the powder environment is changing as the layer-by-layer buildup proceeds.

'Commercial SLM machines do not permit access to specific process parameter information and tool paths,' said Bill Carter, a researcher with GE's Additive Manufacturing Lab, which is under GE's Global Research. 'This limits the ability of researchers to perform controlled validation experiments that support modeling work and process development.'

'If you were able to process a 3D part by telling the machine what are the right laser parameters for optimizing the heating and melting for each layer, then the overall

manufacturing process can be made more robust and efficient', added Matthews.

Software algorithms

The engineers are developing software algorithms that will be compatible with all 3D printers that produce metal parts. This software will be able to control the scan laser's parameters, such as beam size, scan rate and power, on the materials, its powder characteristics and the detailed shape of the part being printed.

Because the software will be available to the public, Matthews hopes it will lead to more breakthroughs in the AM industry.

Lawrence Livermore National Laboratory;
www.llnl.gov

Hybrid kit wins first 3D printing award

Hybrid Manufacturing Technologies Ltd has won the inaugural International Additive Manufacturing Award (IAMA) for its 3D printing machine hybrid technology.

The submission is a hybrid kit innovation that can be integrated into any CNC machine to allow for metal deposition (via laser cladding), finishing and inspection of parts on a single machine. The hybrid methodology integrates directed energy deposition into multi-axis CNC machine, using a tool changer to change between processes.

'Hybrid technology is exciting because it offers a new way to adopt additive manufacturing – as an upgrade to a CNC machine tool,' said Dr. Jason Jones, co-founder and CEO of Hybrid Manufacturing Technologies. 'Adding tool-changeable deposition heads to an existing CNC machine enables 3D printing of metal, without the need to buy a separate machine. This significantly reduces costs and provides an intuitive adoption path for CNC operators. The combination of additive with machining offers new capabilities, including in-process finishing, that cannot be delivered by either technology independently.'

Dynamic innovations

The IAMA, which took place in Orlando, Florida, is the result of a partnership between AMT, The Association For Manufacturing Technology and VDW-Verein Deutscher Werkzeugmaschinenfabriken (German Machine Tool Builders' Association). AMT and



Orlando, Florida, location of the inaugural International Additive Manufacturing Award (IAMA).

VDW, with media support from Gardner Business Media and VDI Nachrichten and sponsored by the European Machine Tool Association CECIMO, announced the annual IAMA at IMTS – The International Manufacturing Technology Show 2014.

'It was incredibly exciting to see so many dynamic innovations presented from around the world for this award,' said Douglas K. Woods, AMT president. 'It speaks highly to the evolution of additive technologies and the realization of radical productivity improvement for manufacturing. The winning submission from Hybrid

Manufacturing is a perfect nod to where we foresee the industry's future: an integration of 'subtractive' CNC machining with the evolving capabilities of additive. It's a perfect combination of existing technologies made better through new and leading-edge innovation.'

Along with the award, Hybrid Manufacturing Ltd will also receive a US\$20,000 cash prize and a media package valued at US\$80,000 to promote the winning hybrid kit innovation.

International Additive Manufacturing Award (IAMA); www.additive-award.com