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INTERESTING APPLICATIONS OF

METAL ADDITIVE MANUFACTURING IN INDUSTRY

Metal additive manufacturing is revolutionising industry. We truly are experiencing a second industrial revolution. In this infographic we discuss how industry is benefiting and highlight some of the more interesting applications of metal additive manufacturing in industry.

BENEFITS OF ADDITIVE MANUFACTURING IN INDUSTRY

There are many benefits to additive manufacturing in industry. We've listed just a few here to give you a flavour of what is possible:

Lower costs

There are a massive number of ways in which additive manufacturing can reduce costs, these include: less material wastage, reduced stockholding costs (stock can be made to order and insmaller batches)

Faster Production

Parts / components can be manufactured rapidly from CAD models, with much less dependence on skilled labour

Fewer production support processes

Production support such as expensive tooling and in some cases machines will no longer be required

More environmentally friendly

Additive manufacturing processes significantly reduce waste compared to traditional factory methods. CAD drawings reflect only materials which are needed, this type of project is definitely environmentally friendly

Prototypes / one-off's feasibility

Prototypes can easily be made and also one-off's and/or smaller production batches are much more feasible as there is dramatically less batch set-up costs

There are a range of applications in particular which are well suited to additive manufacturing, far from being a technology used by hobbyists; additive manufacturing is now being used by some of the largest companies in the world. There are literally thousands of applications which would benefit, but we've chosen four here to illustrate.

TURBINES & TURBOS

The production of turbines and turbos has been revolutionised through additive manufacturing. Always regarded as complex to produce and needing to be as light as possible and ultra-safe to meet the needs of the Aerospace industry (in particular) there are a range of reasons why turbines are increasingly produced through additive manufacturing:

Reduced manufacturing time

There are a number of case studies where additive manufacturing has proven to reduce delivery lead-time for the production of turbines. Siemens for example found in trials that times on two projects were reduced from 44 to 4 weeks and 16-20 weeks down to only 48 hours.

Materials cost reduction

Typically in traditional manufacturing a whole part would be made and then areas not required were drilled out. With additive manufacturing the turbine is built from powder level and developed to the CAD drawing which is precise and has much less wastage.

Reduced complexity

Due to additive manufacturing being able to computer program the part design, turbines which are particularly complex to manufacture can be more easily manufactured using additive manufacturing techniques.

Lightweight design

Additive manufacturing can work with materials which are lighter and very difficult to work with using traditional methods (e.g. Titanium Aluminide).

TOOL REPAIR

The repair of tools through additive manufacturing is a particular growth area, especially when using direct metal laser sintering (DMLS). Typically fine layers of metal powder are melted to repair the area of the tool affected. Here are some benefits of using additive manufacturing for tool repair:

"Principle" of repair instead of replace

Often in industry when tools have become worn the approach has been "replace", with new additive manufacturing methods the mentality needs to swing to "repair". This approach enables quick repairs to the damaged areas only

Less downtime

Repairs are generally quicker than replacement of tools. In some cases new tools can take weeks to arrive whereas often tool repairs can be made much faster than when using traditional methods

Longer operating life

Naturally repairs will increase the operating life of tools, which is good for cash flow, is environmentally friendly and is also great for staff familiarity and efficiency

Cheaper

Overall the costs of repair using additive manufacturing are cheaper

Rebuild parts of tools

Sometimes parts of tools are rebuilt (rather than the entire tool). With additive manufacturing the worn areas can be rebuilt layer by layer using additive manufacturing

Simpler than other repair methods

Traditional repair methods can include welding, machining, re-polishing and testing, etc. These can be avoided through additive manufacturing

DENTAL & ORTHOPAEDIC IMPLANTS

Dentistry is an industry which is full of one-off, expensive designs e.g. crowns, bridges, dentures, etc. Additive manufacturing has been richly embraced in dentistry and orthodontics; some of the reasons for this are detailed below:

Cost-effective

Dental and orthopaedic implants can be more cost-effectively made through additive manufacturing, which is popular with the patient and dentist alike! Greater cost efficiencies are experienced when using CAD to generate models, rather than repeatedly using a skilled dental technician to produce the same design.

Faster production time

Dental products can be produced much quicker; particularly in bulk runs where products are printed off in a batch with minimal human intervention. This enables very fast production of the products compared to traditional techniques.

Consistently high quality

There are said to be 6.8 million dental units produced per year, although the quality is not said to be better than traditional techniques, time has proven that quality is comparable.

Industry standards compliance

Dental products comply with the prevailing dentistry standards - EN 1641 and EN ISO 22674.

JEWELLERY

Additive manufacturing in jewellery is now so prominent it can be considered "the norm". The technique allows for a variety of metals and gemstones to be used in a number of ways not previously possible. Here are some of the reasons the jewellery trade has adopted additive manufacturing so eagerly:

High degree of intricacy

Jewellery designs are often highly intricate. This intricacy can easily be built into additive manufacturing techniques; these just need to be designed into the CAD model. This intricacy can be produced manually but would require very expensive and highly skilled jewellery designers to complete.

Think outside the box / unusual designs & shapes

With additive manufacturing unusual designs and shapes are "limited by one's own imagination". The opportunities are endless, the last 10 years has seen a shift away from using experienced jewellery designers to more regular (and less expensive) CAD designers.

Full density with less porosity

Full density jewellery, which is less porous, can be deliberately designed with additive manufacturing. This can often be a problem with traditional techniques.

Cost effective creation of one-off pieces

Time saved = lower costs, which means extra profit or a lower price to the customer. One-off pieces can be created more quickly using CAD than traditional drawing/desk techniques.

Reduced development time

Jewellery can be produced much more quickly using additive manufacturing techniques.

Lower machine costs

A barrier to entry (for some) in the jewellery costs was the price of machines. Additive manufacturing machines could offer a saving of up to 85% one industry professional commented.

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