OBSERVATIONS

FLUID AND PARTICLE DYNAMICS IN LASER POWDER BED FUSION

Ioannis Bitharas et al.

Good to see a second paper on this topic by Heriot-Watt University and the University of Birmingham. This paper highlights the importance of finding a good process parameter to minimise the denudation effect. The high-speed images of single tracks backed up this suggestion as the direction of plume changed and created a different denudation pattern for different process parameters. I am happy to see that this work was extended to multiple tracks and for multiple layers, as single line scans do not fully represent conditions of all real-time applications.

Ravi Aswathanarayanaswamy, Renishaw

STUDY ON POWDER BLOWN LASER CLADDING OF VERTICAL SURFACES

Piotr Lubaszka & Bernd Baufeld

This is an interesting article which tackles the general assumption that laser cladding cannot be used in configurations requiring significant deviations from the downhand position (1G ASME/PA ISO 6947). While it is true that laser cladding process parameters developed for cladding in the downhand positon cannot be simply transferred to other orientations, due to the effect of gravity on the powder stream and melt pool, this does not mean that appropriate parameter sets cannot be developed for such configurations. The authors have very clearly demonstrated not only the ability to develop KPV combinations which produce claddings in the horizontal (2G ASME/PC ISO 6947) position, but that the parameters can be refined to ensure that the resultant microstructure is comparable to that obtained by conventional cladding in the downhand position.

This is a very positive step in addressing what is commonly seen as one of the limitations of the laser cladding process. It would be interesting to see more work like this applied for use with mobile laser cladding equipment which can then be used for the performance of repairs to components 'in situ' or surface treatment of large components, as in this case in this article, which are too massive to be manipulated under the cladding head in the conventional way.

Paul Goodwin, TWI

LASER WELDING PLASTICS – A SHORT GUIDE

Ian Jones

The article by Ian Jones is very well written and extremely informative in relation to the different types of laser, and the laser-welding techniques used for plastics. It also delivers a clear and concise understanding of the science behind the process.

From a production perspective however, many plastic parts will have been manufactured by injection moulding. These components can become slightly distorted during the post moulding cooling process or through improper handling prior to welding. It is essential therefore, that variations with the manufacturing processes however slight, are understood by both the product designer and the supplier of the laser welding system.

Joint design, specifically in relation to the positioning and dimensions of any joint melt/collapse area, requires careful consideration to ensure that this remains consistent. Other key factors are the design of the component fixtures and the clamping pressure to be applied during welding. Too little pressure may result in no fusion between the parts, and too much pressure could cause the weld joint above to collapse prior to the welding process commencing. Dissimilar materials may heat up at different rates, causing distortion during welding.

Andy Toms, TLM Laser

LASER SHOCK PEENING OF METALS AND ADVANCED CERAMICS

Pratik Shukla

As a manufacturer of high-energy nanosecond lasers, Litron has watched the Laser Shock Peening application develop with interest. For a number of years, we have been supplying custom built lasers for LSP to increase the life of components within nuclear reactors, where this application has been field-proven and successful.

In recent times we have seen a sharp increase in the research into and applications of this technique for other industrial processes in other markets worldwide, some of the key ones being additive manufacturing, automotive and aerospace component manufacture. We are eagerly anticipating a growth in the uptake of LSP once these activities progress through to manufacturing, as this process is such a good fit for the laser sources we manufacture.

James McDowell, Litron Lasers

LASER ABLATION: LAYER REMOVAL AND SURFACE TREATMENTS

David Van De Wall

David has provided us with a useful white paper on the types of laser ablation and marking applications found in medical device manufacture. The classic application over the last twenty years has been laser stripping marker bands on guidewire and hypotube over-jackets made from PTFE coatings, using q-switched lasers at 1064 nm. As David points out selective roughening of areas of the underlying bare metal for gluing can also be performed, and with the same laser tool.

These devices are used in delivery systems for stenting blocked arteries. Many of us will know someone that has had heart stents placed and carried on an active lifestyle after this minimally invasive procedure. Laser technology plays a major role in the entire manufacture of these devices from the delivery system that deploys the stent, to the stent itself with processes in cutting, welding, marking and ablation of both polymer and metal components. As David remarks the demands on laser wire stripping processes are steadily increasing due to miniaturisation. Components such as the tiny electrodes used for brain stimulation and control in diseases like Parkinsons and Benign Essential Tremor require laser ablation often with ultrashort pulsed lasers. It is great that our industry enables so many of these lifesaving and transforming activities.

Jonathan Magee, Coherent | Rofin