

New process for narrow pipes

iClad[®] enables treatment of internal contours from a diameter of 30 mm

The greatest challenge in many processes is not the question of "How?" but of "How long?". All too often, tool breakage or damage leads to unplanned production stops. There are many reasons for such wear and tear to tools and components: abrasion, corrosion, erosion, stress cracks, thermal-mechanical or chemical fatigue. On top of the high costs of replacing the tools or having unique tools made again and of the concomitant downtimes, product defects due to faulty moulds and tools also have a considerable negative financial impact. In addition, subsequent requests for alterations to already manufactured components or the reworking of incorrectly machined tools also cause substantial costs. There is great demand here for processes that combine improved process and product quality with sustainable profitability. The answer to material fatigue and undesired material defects is laser cladding. Material properties can be specifically optimised, components qualitatively improved and damages structures restored. Thanks to precise material coating, reliable reproducibility and equally low levels of both thermal and mechanical strain on the tools, this process has become indispensable in the tool- and mould-making sector. But until recently the process had its limitations when it came to inaccessible internal contours or blind bores that could not be reached with conventional processing heads. Now, with iClad[®], an internal processing head for access aperture diameters of down to 30 mm and working depths of up to 500 mm, whole new dimensions have now opened up for the protection and repair of internal contours.

In a nutshell

The demands on modern surfaces are very complex. In many cases, components and tools can only be effectively protected against wear and tear through a coating or through the building up of specific three-dimensional surface structures. Laser cladding offers the possibility of optimising basic material and surface function to meet the demands of the specific application, fast, efficiently, and cost-effectively. This is due to the special properties of the laser, which, thanks to its excellent focussing capacity, applies heat within very strict local limitations and therefore causes only marginal warpage. The laser beam melts the existing component surface and the powder jet-sprayed onto it, and joins them metallurgically into a dense coating with low dilution. This precise material coating minimises the need for reworking and prevents undercuts and loss of hardness or strength. High-power Nd:YAG or diode lasers in particular have proven themselves suitable for this procedure for cost-efficient surface treatment.

Access to inner contours

The preconditions for the use of this technology in the industrial environment are stable production processes with robust and reliably controllable processing heads. In the meantime, a range of efficient conventional processing heads are available for the treatment of the external surfaces of heavily stressed components. But up to now, this tried and tested process could not be applied wherever the access to damaged surfaces and structures had a diameter of less than 100 mm. And yet it is exactly in the access range below 100 mm that many users are in particularly great need. Whether valves or pump casings, offshore drillpipes, turbines for aircraft, power stations or ships, pressing or injection moulds: unrelenting stress through grinding, chafing, pressure, heat, chemicals or moisture frequently lead to unwanted loss of or changes to material. The breakdown of the component in question is a significant danger to the efficiency, punctuality and reliability of the processes. But now the remedy is available, in the form

of the miniaturised iClad[®] processing head for laser cladding of internal contours. For a wide variety of inaccessible parts that are subject to wear, this processing head, which is applicable for access aperture diameters down to 30 mm, covers the complete range of internal surface treatment needs: hardening, alloying, and coating.

Compact solution

"The special challenge in the development of iClad[®] was to integrate all the necessary assemblies, for beam guidance and beam forming as well as for process media feed, into a suitably compact casing," explains Stephan Kalawrytinios, Managing Director of Pallas GmbH & Co. KG, which is located in Wuerselen near Aachen, Germany. Pallas is developing and marketing the iClad[®] processing head. It has a modular structure which allows different heads to be attached for different working diameters. Each iClad[®] head consists of the three modules powder feed nozzle, main body and fibre plug. The plugs for fibre cables and feed lines for the process media are located at the rear end of the head, which is directly water cooled. The cooling system is optimally designed to prevent overheating of the optical components. This ensures that the processing head can deal long-term with the thermal strains of industrial application. Protection against contamination or destruction through deposits of powder particles is provided by an internal lens protection. In addition, the optical path is constantly flushed with shielding gas.

A clever head

The pipe to be treated is rotated around the fixed processing head. The head can be fitted with different beam nozzles, whereby the position of the working point determines whether the laser beam angle must be 30° or 90°. Blind bores can be coated without any problem using a 30° head, as in this case the laser's working point is in front of the head. In the case of through bores, the 90° angle of the laser beam is normally used. Fixed processing heads are

normally used for working depths up to 500 mm and with a laser power output limited to 3 kW. Depending on the diameter, Pallas provides various iClad[®] heads which can also be operated, according to their size, with different power outputs. Individual adaptations to customer specifications are available on request. All iClad[®] processing heads for the treatment of inner contours have an optional camera connection for calibration or for monitoring the process. This renders iClad[®] deployable for 2D and 3D applications wherever the operating diameter is as small as a two-Euro coin. The head can be attached to existing lasers via standard connectors. Its simple operation makes this innovative, slimline processing head for treatment of inner contours the system of choice whenever things get really tight.

Precision work

Pallas develops complete solutions and defines the design of the head tailored precisely to the component geometry to be processed. In addition, the subsequent construction, implementation, application testing and after-sales service are all in the hands of this specialist company for surface technology. Within two days after delivery, Pallas installs the finished head – including briefing and approval. Even after commissioning, Pallas continues to provide customers with guidance and assistance, be it for various measurements, optimisations or replacement of optical components and processing heads. Stephan Kalawrytinios sees a wide range of potential applications for the head. "Up to now there has been no real answer to this sort of industrial demand. But now we can provide a production-ready modular solution for industrial use for process-optimisation or repair of previously inaccessible surfaces. iClad[®] is the key to success in completely new applications."



For further information, please contact:

Pallas GmbH & Co. KG
Adenauerstraße 17
D-52146 Würselen
Tel: +49 (0) 2405/4625-0
Fax: +49 (0) 2405/4625-111
E-Mail: info@pallaskg.de
www.pallaskg.de

Copyright free. Please send a copy to:

impetus.PR
Ursula Herrling-Tusch
Charlottenburger Allee 27-29
D-52068 Aachen
Tel: +49 (0) 241/189 25-10
Fax: +49 (0) 241/189 25-29
E-Mail: herrling-tusch@impetus-pr.de

New process for narrow pipes

iClad® enables treatment for internal contours from a diameter of 30 mm



Picture 1: The modular structure of iClad® allows different heads to be attached for different coating challenges.



Picture 2: For many inaccessible parts that are subject to wear, iClad® covers the complete range of internal surface treatment needs.



Picture 3: iClad® achieves high-quality coatings even when things get tight (diameters down to 30 mm).



Picture 4: Dipl.-Ing. Stephan Kalawrytinios, Managing Director at Pallas

Pictures 1-4: © Pallas GmbH & Co. KG

We would be pleased to send you these or other images in printable resolution via e-mail.

Such image material may be used solely for the Pallas subject stated here. Any and all other uses, and use for non-Pallas corporate purposes in particular, is hereby expressly prohibited.



impetus.PR
Agentur für Corporate Communications GmbH

Ursula Herrling-Tusch
Charlottenburger Allee 27-29
D-52068 Aachen
Tel: +49 [0] 241 / 1 89 25 - 10
Fax: +49 [0] 241 / 1 89 25 - 29
E-Mail: herrling-tusch@impetus-pr.de