

□ A small processing head with great potential

iClad makes replacement of critical components avoidable

In the race against time, the specialists at the Dutch company Stork Gears & Services BV, Rotterdam, have made a name for themselves all over the world in sectors like the shipbuilding, petrochemical, wind power and steel industries. In all of these branches, the maximum uptime of efficient gearboxes and associated drive systems is of crucial importance. As quickly as possible, the experts at Stork repair damaged or failed gearbox-related components, rebuilding them or replacing them with new parts. In emergencies, Stork's engineers are even on the spot within a day. In this line of work, laser cladding is used as a tried-and-tested technology to prevent wear-out and unwanted material changes. The team led by Jelmer Brugman, head of Stork's laser cladding department, successfully apply this technique on more than 20 gear repair or modification jobs per month on average. However, in about 10 percent of the cases, inaccessible internal surfaces could not be treated with conventional laser processing heads. Until about a year ago, there was no alternative but to replace the damaged parts with new ones. The solution to this problem is iClad, a laser processing head developed by Pallas GmbH for the treatment of internal contours from a diameter of 26 mm and to a depth of 600 mm. By using this innovative processing head, the Dutch company has opened up new possibilities for the repair of critical components. Compared with the previously unavoidable effort involved in such cases for the production of a new part from scratch, this technology means that several weeks of repair time can be saved.

In the maritime industry, in power stations or wind power plants, gearboxes and gearwheels have to operate reliably over long periods of time under the hardest of conditions. In many different sectors, corrosion, abrasion and erosion put such drive systems under extreme pressure. This results in broken or damaged gearwheels, leading to unplanned downtimes or, in the worst case, complete failure. Since last year,

however, Stork Gears & Services have been successfully using the new iClad processing head for the preventative maintenance, modification and repair of such heavily stressed drive systems. Now, both damaged and new components can be optimally coated with low distortion using a 2-kilowatt diode laser. The surface of the component and the powder jet-sprayed onto it are melted by the laser and joined together metallurgically with minimal dilution. The previously available processing heads were only deployable for internal contours with an access aperture of at least 100 mm diameter, or were limited to the treatment of freely accessible surfaces.

Perfection down to the last detail

The iClad processing head, developed by the company Pallas GmbH, headquartered in Wuerselen near Aachen, Germany, in collaboration with the Aachen Fraunhofer Institute for Laser Technology (ILT), can be used from a diameter of 26 mm and to a depth of 600 mm for the complete range of laser cladding tasks. Whether hardening, alloying, or coating – even in the tightest of internal spaces iClad renders the most demanding internal surface treatments possible. All processing heads consist of three modules: powder feed nozzle, main body and fibre plug. The compact casing houses all the necessary assemblies for beam guidance and beam forming as well as for process media feed. The highly-stressed optical path is constantly flushed with shielding gas. Overheating of the optical components is prevented by an active water cooling system. An internal lens protection prevents contamination or destruction through deposits of powder particles. For Jelmer Brugman, laser cladding with iClad has significant advantages. Using the new processing head, highly-strained critical components that were previously inaccessible can now be optimised or repaired with a coating specifically designed to meet their respective stress loads.

iClad passes the test

As one of the first industrial-scale users, Stork Gears & Services deployed the newly developed processing head, a prototype of iClad with integrated collimation as a special feature. This was a fixed 42-head with a working depth of 500 mm for the internal coating of 50 mm bores. The excellent collaboration between Pallas and Stork was also evident during the required adaptation of the head to the existing diode laser. In addition

to gearwheels and clutches, gearbox casings are also treated using the new technology. On average, Stork deals with three gearbox repairs per month. One-piece gearbox casing models used to pose a real problem, as laser cladding by means of the standard processing heads was not an option. Before iClad was deployed, the alternative, the production of a completely new casing, used to take several weeks. Now, the filigree processing head for laser cladding of internal contours makes it possible to save time on the repair of a damaged gearbox and thus to reduce the duration of downtimes, a factor of great market relevance. "For our customers, time is of the essence!" says Jelmer Brugman. The reduction in costs that goes along with this new approach to repairs is of far less importance to the customers. So far, Stork has successfully used iClad on about 20 jobs – most of them demanding single-piece projects, i.e. not serial production. The new technology has proven itself both for repairs and for the production of new components. After just one year of deployment, the slender optical processing head for the laser treatment of hard-to-access inner contours has already significantly enlarged Stork's scope of service. Previously inaccessible surfaces and structures of critical components are now being successfully equipped in record time with specific coatings to meet the challenges of their wear-intensive daily lives.

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