

Hybrid Welding with 8kW IPG Fiber Laser

Laser-arc hybrid welding has been applied to the general merchant ship for the first time in the country. Nagasaki Shipyard acquired the approval from the society of shipbuilding. The thermal deformation of the component has been substantially reduced and thus the construction efficiency has improved.

Mitsubishi Heavy Industries, Ltd., has applied the shipbuilding welding operation method of laser-arc hybrid welding to the general merchant ship for the first time in the country. The Nagasaki Shipyard has recently acquired the approvals from the Japanese Maritime Affairs Association and the English Lody Shipbuilding Society. The laser-arc hybrid welding has substantially reduced the thermal deformation and improved the cosmetic appearance, important for a passenger ship. In addition, it is useful to improve the construction efficiency for all kinds of ship.

While assuring the application to the actual boat, it is about to be applied to other internal shipyards. It contributes to 30% improvement of efficiency which “thing making reformation movement” aims and keeps advancing the differentiation of shipbuilding-related technology.

Since the laser welding makes the deep penetration with high efficiency (by comparison with usual arc welding, the penetration could be made much deeper), it is being put to practical use especially in the automobile which needs the sheet metal products. On the one hand, because unlike arc welding it doesn't use the welding rod as the jointing material, it was thought that it didn't seem possible to put the practical use into the shipbuilding industry which required the high degree of precision and uses the thick steel plates. That the welding quality of the joint could be lowered was the one of the biggest concerns.

The laser-arc welding is the automatic welding method which combines the conventional arc welding which has been easily used with the laser welding that can decrease the total heat input by centralizing the energy into one point. With the application to shipbuilding field, it could make up the weak points like the component deformation by the heat input of arc welding. By raising the finishing precision of the hull block, it can decrease the additional working processes such as on-site cutting to adjust, deformation correcting, etc. Besides it helps to finish the appearance well and contributes to the improvement of construction efficiency as well as quality.

Nagasaki Shipyard has started the engineering development of laser welding while studying the up-to-date welding operation method together with the technical headquarter which has the high technology of laser processing from year 2007. Laser-arc hybrid welding uses the advantages from the process that laser welding follows the arc welding path.

The product quality such as defective level, tenacity and fatigue strength of the joint whose maximum thickness is 13mm has been guaranteed. It was proven practical on shipbuilding site even from the viewpoint of precision management criteria and operation knack

We have built the fiber laser system at Nagasaki Shipyard Koyagi factory (Nagasaki city) and also are trying to strengthen the quality and cost competitiveness in the same factory. At the same time, we are promoting this system to other shipyards where the same technology could be introduced.