

스캐너와 산업용 로봇을 이용한 고속 레이저 용접에 관한 연구

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A Study on High Speed Laser Welding by using Scanner and Industrial Robot

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Abstract

On this research, laser welding technology for manufacturing automobile body is studied. Laser welding technology is one of the important technologies used in the manufacturing of lighter, safer automotive bodies at a high level of productivity; the leading automotive manufacturers have replaced spot welding with laser welding in the process of car body assembly. Korean auto manufacturers are developing and applying the laser welding technology using a high output power Nd:YAG laser and a 6-axes industrial robot. On the other hand, the robot-based remote laser welding system was equipped with a long focal laser scanner system in robotic end effect. Laser system, robot system, and scanner system are used for realizing the high speed laser welding system. The remote laser welding system and industrial robotic system are used to consist of robot-based remote laser welding system. The robot-based remote laser welding system is flexible and able to improve laser welding speed compared with traditional welding as spot welding and laser welding. The robot-based remote laser systems used in this study were Trumpf's 4kW Nd:YAG laser (HL4006D) and IPG's 1.6kW Fiber laser (YLR-1600), while the robot systems were of ABB's IRB6400R (payload:120kg) and Hyundai Heavy Industry's HX130-02 (payload:130kg). In addition, a study of quality evaluation and monitoring technology for the remote laser welding was conducted. The welding joints of steel plate and steel plate coated with zinc were butt and lapped joints. The quality testing of the laser welding was conducted by observing the shape of the beads on the plate and the cross-section of the welded parts, analyzing the results of mechanical tension test, and monitoring the plasma intensity and temperature by using UV and IR detectors. Over the past years, Trumf's 4kW Nd:YAG laser and ABB's IRB6400R robot system was used. Nowadays, the new laser source, robot and laser scanner system are used to increase the processing speed and to improve the efficiency of processes. This paper proposes the robot-based remote laser welding system as a means of resolving the limited welding speed and accuracy of conventional laser welding systems.

Key Words : Laser, Welding, Scanner, Robot, Quality, Interface, Synchronize