Hybrid Laser Arc Welding (HLAW) of Various Materials in Butt Joint Configuration

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The HLAW (Hybrid Laser Arc Welding) method is becoming one of the most promising methods of welding various metallic materials. This method uses a laser and Metal Active Gas (MAG) electric arc in one process. The hybrid process has the individual advantages of both welding processes. Deep penetration hybrid welds can be comparable with the penetration depths achieved by laser welds but, at the same time, have a tolerance to joint fit-up and a weld gap profile that is more comparable with arc welds. Furthermore, arc welding consumables (and gas mixtures) can be used, offering greater control over weld quality and properties than is possible with autogenous laser welding. In the past few years, the HLAW method has become increasingly popular in industrial applications and found implementations in the shipbuilding industry, power engineering, automotive industry, and aerospace.

This paper explains recent welding work with a high-power fiber laser and HALW on various materials. It briefly compares the characteristics of laser welding and hybrid laser-MAG welding for welding a range of materials used in shipbuilding and aerospace. Hybrid laser-MAG welding has advantages over autogenous laser welding thick sections regarding the preferred weld profile, high productivity, and excellent tolerance to gaps.