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NEW REINFORCEMENT METHOD OF IMPACT BRUISING ALLOY THIN-WALL TANK

Abstract

The alloy thin-wall tank was impacted accidentally during production, the formed bruising decreased thickness of the wall, and was easy to create large stress concentration, which was the critical failure origin of tank. The traditional repair welding method could not satisfy the strength requirement yet. Through analyzing stress characteristic and tightness of the tank, the non-metal material adhesive reinforcement method was proposed. In order to screen the optimum scheme, several groups of flat plates with different thickness and shape were designed for contrasting tests on tension capability of the adhesive, linear expansion factor, inter-laminar shear strength, and also effects on single-side or double-side reinforcement. Meanwhile, all these schemes were optimized by FEA; finally, the scheme of circular high-strength glass fabric plates with DW-3 adhesive bonded on double sides of the bruising area was proved to be the optimum one, because double-side circle plates could reduce boundary shear stress and made the bruising area deform compatible with the tank. At last, the reinforced tank passed working-pressure test successfully, which indicated that this reinforcement method was efficient and reliable, also it is a new way to solve impact bruising during tank manufactory and reduce the costs of product.