

عنوان مقاله:

Effect of process parameters on tensile strength of welds and modeling of laser welding of PA6/NBR/clay nanocomposite by response surface methodology

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خلاصه مقاله:

Polyamide 6 / nitrile butadiene rubber / nanoclay (PA6/NBR/clay) nanocomposite has gathered wide acceptance in industry. Laser welding, as a fabrication method, is applied to welding of polymer nanocomposites. In this study, the input parameters (clay (Closite 30B) content, laser power, scan velocity and stand-off-distance) are varied to achieve the best responses (tensile strength of welds). Response surface methodology (RSM) is utilized to investigate the effect of input parameters on mechanical properties. Morphology and tensile properties of nanocomposites were observed with scan electron microscopy (SEM), transmission electron microscopy (TEM) and tensile test. The results demonstrated that increasing the clay content from 1 to 5%wt and stand-off-distance from 4 to 8 mm decreased tensile strength of welds about 15% and 5%, respectively. The tensile strength of PA6/NBR composite is 25.6, whereas the prediction models showed that under optimal conditions of laser power of 105 W, scan velocity of 300 mm/min and stand-off-distance of 4 mm, the maximum tensile strength of PA6/NBR nanocomposite with 1, 3 and 5 % nanoclay are 27.2 MPa, 27.6 MPa and 24.7 MPa, respectively. These tensile strengths are about 99, 89 and 73% of .the strength of these nanocomposites before welding

کلمات کلیدی:

PA6/NBR/Nanoclay, Nanocomposite, laser welding, response surface, methodology

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