Energy and Material Savings in Heat Assisted Forming Of Sustainable Tailor Welded Blanks

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Abstract

This study emphasis on the sustainable production of tailor welded blank (TWB) components used in automobile body without compromising on its crashworthiness and structural rigidity. TWB products are manufactured by a combination of two or more blanks, consisting of different materials and thicknesses. Weld line movement occurs in cold formed TWB products which lead to formation of wrinkles and premature fractures, thus affecting the accuracy of the products. In order to avoid the undesirable weld line movement (WLM), a method of heat assisted forming of TWB is adopted by selectively heating the stronger / thicker material during forming [1].

Numerical simulations were conducted at different temperatures and thickness ratios to study the sustainable aspects involved with energy and material savings. The kinetic energy during punch travel resulted in energy savings. It also resulted in lower energy consumption during forming operations. By reducing the thickness of the sheets, the weight of the formed component has been brought down, thus contributing to material savings. The results show a reduction of punch load to an extent of 75% and material saving of nearly 33%.

Overall, heat assisted forming of TWBs reduced the weld line movement, improved accuracy and saved material and energy in the manufacture of TWB components [2]. The paper also discusses about the efficient methods of producing raw materials and to minimize emissions at the production stage itself. The analyses of power consumption and minimizing the WLM have proven that the usage of heat assisted forming during the manufacture of TWB guarantee the application of this method in automobile industries[3].

References:
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