Experimental Mechanics - 29th Symposium

Warszawa, Poland, October 19÷22, 2022

STAND TESTS FOR SELECTED COMPONENTS OF SPECIAL VEHICLES UNDER STATIC AND CYCLIC LOADING

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The quality of components for different branches of industry is determined by means of testing machines as well as standing stations [1] having servomotors and platforms with "T" slots. The mechanical testing machines enable to obtain stress-strain characteristics and mechanical parameters using various types of specimens. The standing stations are used for determination of the static loading capacity or fatigue durability of the final product. They are typically applying to test components of different dimensions and shapes, Fig. 1. Among them, one can indicate the following examples: Rear Underrun Protective Device (RUPD), A50-X coupling ball (Fig. 1a), rigid drawbar (Fig. 1b), transport platform with a coupling function (Fig. 1c), and towing boom (Fig. 1d).

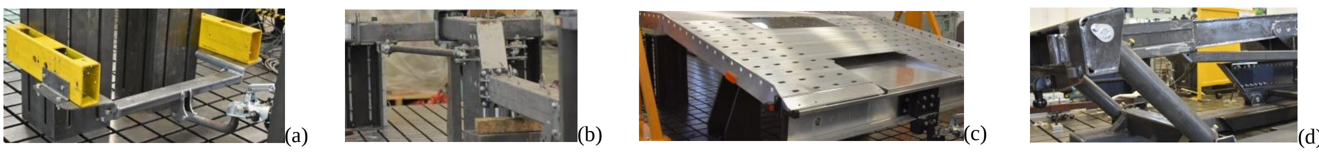

Fig. 1. Components for various branches of industry on stand platform before fatigue durability tests: (a) A50-X coupling ball, (b) rigid drawbar, (c) and (d) transport platform and towing boom, respectively

A selection of the particular test for components investigation depends on the technical features of the element in question. The RUPD protects before underrunning vehicles. Therefore, the static test [2] is used under force equal to 180 kN or 85% of the maximum mass of a vehicle, whichever is smaller. A cyclic loading is applied [1, 3] in the case of the A50-X ball, drawbars, platforms and towing boom for coupling with another vehicle. All these tests were conducted under a cyclic force signal of a sinusoidal shape at a frequency of 7 Hz up to the limited number of cycles, i.e. 2×10^6 (for steels), 3×10^6 (for light metals). In the final stage of fatigue stand tests the permanent deformation and cracks identification were determined. Analyses were conducted by means of macro-photography and dye-penetrant techniques. The results of such investigations enable a determination of the quality either of welds or the entire objects tested, Fig. 2.

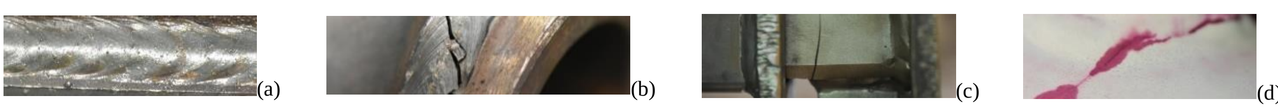

Fig. 2. Welding joints at inspection after fatigue tests: (a) splashes (2×10^6), (b) crack in HAZ, weld and PM (1.5×10^6), (c) crack in HAZ and PM (1.7×10^6), (d) crack in weld and PM (2×10^6), (HAZ – Heat Affected Zone, PM-parent material)

References:

1. T. Szymczak et al. (2019), Materials Today: Proceedings, 12, 2, 207-212.
2. The 58 UN Regulation.
3. The 55 UN Regulation.