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Effect of load mode on fatigue strength of 1180MPa class recycled steel

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Tensile tests and hole expansion tests were conducted on 1180 MPa class recycled steel sheets created from scrap, and two types of fatigue tests with different load methods were conducted in order to understand the fatigue strength characteristics that are important for component performance. Based on these results, we will examine the applicability of recycled steel sheets created from scrap as steel sheets for automobiles.The recycled steel showed a strength-ductility performance comparable or better than that of 980 MPa class steel.: tensile strength of 1234 MPa, total elongation of 18%, stretch-flangeabilty λ of 21%, limiting dome height of 12.2 mm, and limiting drawing ratio of 2.09%. In the fatigue test with a stress ratio R = -1, the mirror finish material had a fatigue limit of 600 MPa at 10^7cycles to failure for both bending load and axial load. The fatigue limit corresponds to half tensile strength that is believed to be the maximum fatigue limit in cases of surface initiation of fatigue. Actually, all fatigue fractures originated from the specimen surface, and no internal initiation from inclusions were observed. The fatigue limits obtained by changing the stress ratio under bending load well matched the corrected Goodman line. Therefore, the effect of average stress can be reliably evaluated from the fatigue limit diagram. In this way, the 1180MPa class recycled steel sheet has high fatigue strength with sufficient reliability and satisfactory meets the required performance of parts as a steel sheet for automobiles

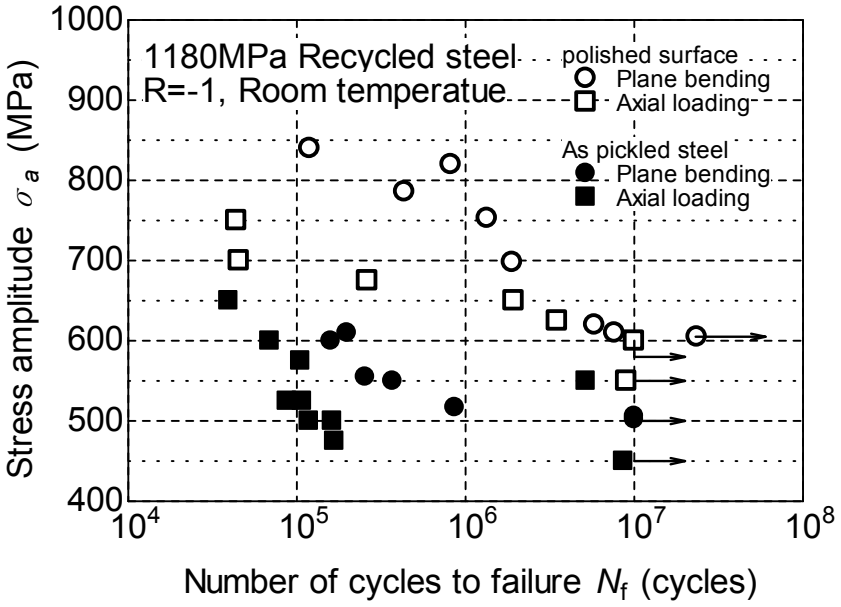

Fig.1 S-N curves obtained under stress ratio of R = -1