20th European Mechanics of Materials Conference - EMMC20
Florence, Italy | May 27th-29th, 2026
www.emmc20.unifi.it

Characterization of the mechanical properties of the reclaimed low-carbon steel by instrumented indentation test

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Paper ID: 199
Symposium S4: Mechanics of architected materials: Experiments and modelling
Extended Abstract

Abstract

Reuse of reclaimed steel elements is vital for sustainable steel construction. The characterization of the mechanical properties is compulsory for their reuse. Nowadays, for reducing costs and time of material testing, the indentation tests, as an efficient non-destructive test, may potentially be employed. The reasonable accuracy for determining yield stress and the portability are some of the interesting benefits of indentation tests. In this paper, the indentation tests are experimentally applied to several reclaimed sections of different carbon steels and the results are compared to classical tensile tests. Based on these results the reliability of the indentation tests is evaluated. Also, the effect of different types of surface preparation is studied. Herein, firstly, a numerical model is defined and validated with Ansys for the indentation test. Then, numerical simulation is conducted, and the yield strength as well as ultimate strength for specific reclaimed carbon steel materials have been calculated. Then, using a portable device, the yield strength as well as ultimate strength for the reclaimed section is calculated. The tensile test is also conducted

on the same materials. The results obtained from the experimental and numerical investigations are compared to confirm the acceptability of the indentation test. The yield strength and ultimate strength obtained illustrate a logical comparison among indentation test and tensile test and numerical simulation with Ansys.

Keywords:

Instrumented Indentation test low carbon steel tensile test