

Correlations of mechanical properties by SPT (Small Punch Test) and conventional tensile test for Al 6061 -T6

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The Small Punch Test (SPT) was developed by nuclear industries to analyse mechanical properties of irradiated materials principally by small volume of the samples. This technique intends to evaluate the materials behavior during the time life of nuclear reactors, where your properties changed by irradiation intensity and exposition time. It is considered an almost "non-destructive" method [2] due to small sample volume and its applications are spreading for use in situations where conventional methods do not apply. SPT consists of pressing a sphere, with a diameter equal to 2.5 mm, in a miniaturized sample of circular geometry (diameter $d = 8$ mm and thickness about 0.5 mm) [1], which has fixed edges, tested in conventional mechanical testing machines with the aid of a device developed for their achievement. In this work, mechanical properties of aluminum (Al 6061-T6) were obtained by two different methods: conventional tensile test and the small punch test (SPT). The SPT results depend on graph interpretations and discussions take place at now. Correlations of results guide us in choosing the most appropriated method for interpreting the force x displacement graph from SPT. Acknowledgements: We thank Dr. Arnaldo H. P. Andrade for his invaluable collaboration (in memoriam) References: [1] ASTM E3205-20 Standard Test Method for Small Punch Testing of Metallic Materials, Annual Book of ASTM Standards, Part 03.01, ASTM International, 2020 [2] M. F. Moreno, Effects of thickness specimen on the evaluation of relationship between tensile properties and small punch testing parameters in metallic materials, Materials and Design, 157 (2018) 512-522.