

FABRICATION OF ALUMINUM NANO-COMPOSITES USING FRICTION STIR PROCESSING

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Graduation Project 2

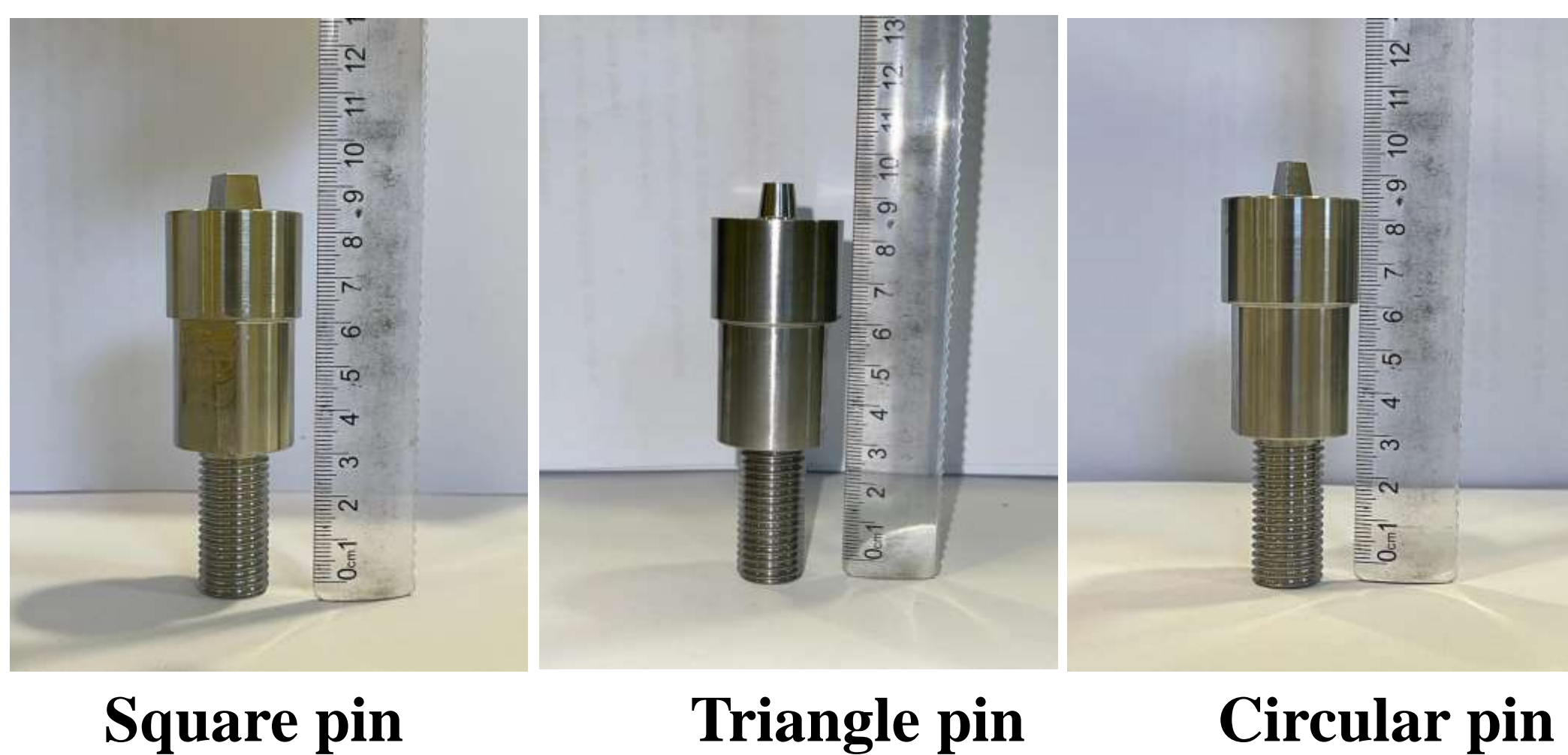
ABSTRACT

- ❖ Friction stir processing (FSP) has been considered one of the most important techniques for fabricating surface composites and has a considerable improvement in mechanical properties.
- ❖ The Friction stir processing (FSP) process is primarily used for the modification of microstructure in near-surface layers of processed metallic components.
- ❖ The aluminum metal matrix composites are finding widespread in engineering applications such as automobile, aircraft.

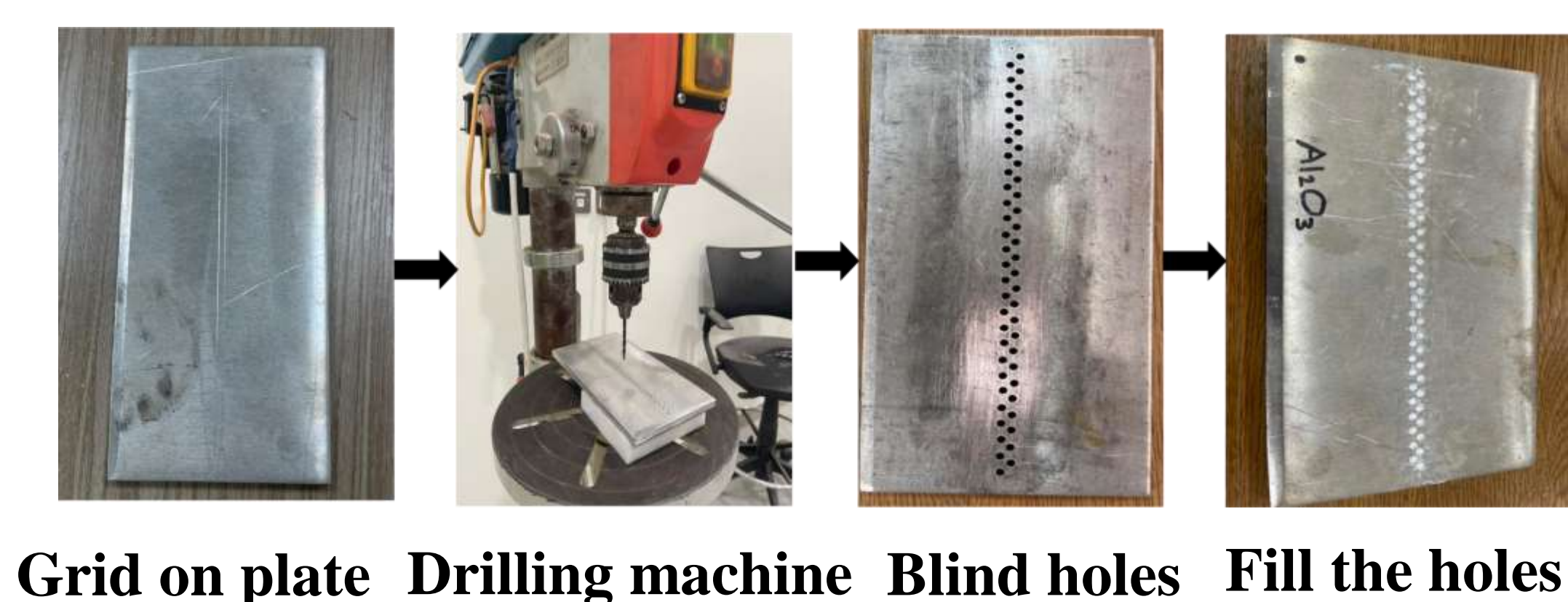
OBJECTIVES

- ❖ Design and manufacturing of FSP tools and fixtures.
- ❖ Conduct the experiments of FSP to fabricate nano-composite at different parameters.
- ❖ Characterization of the fabricated nano-composite using optical microscopy, hardness test and wear test.

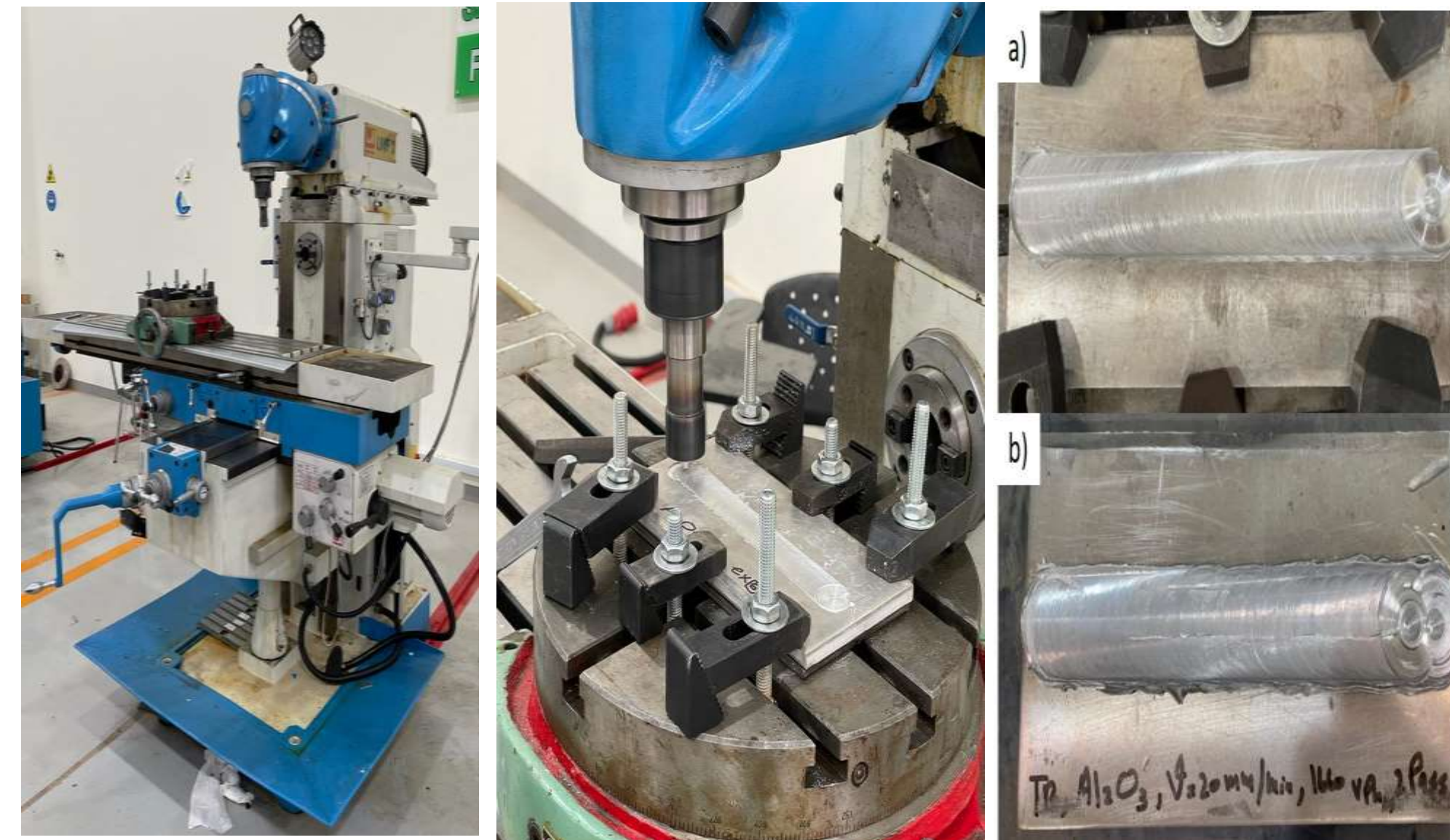
Design and manufacturing of FSP tool



Steps of blind holes on the plate



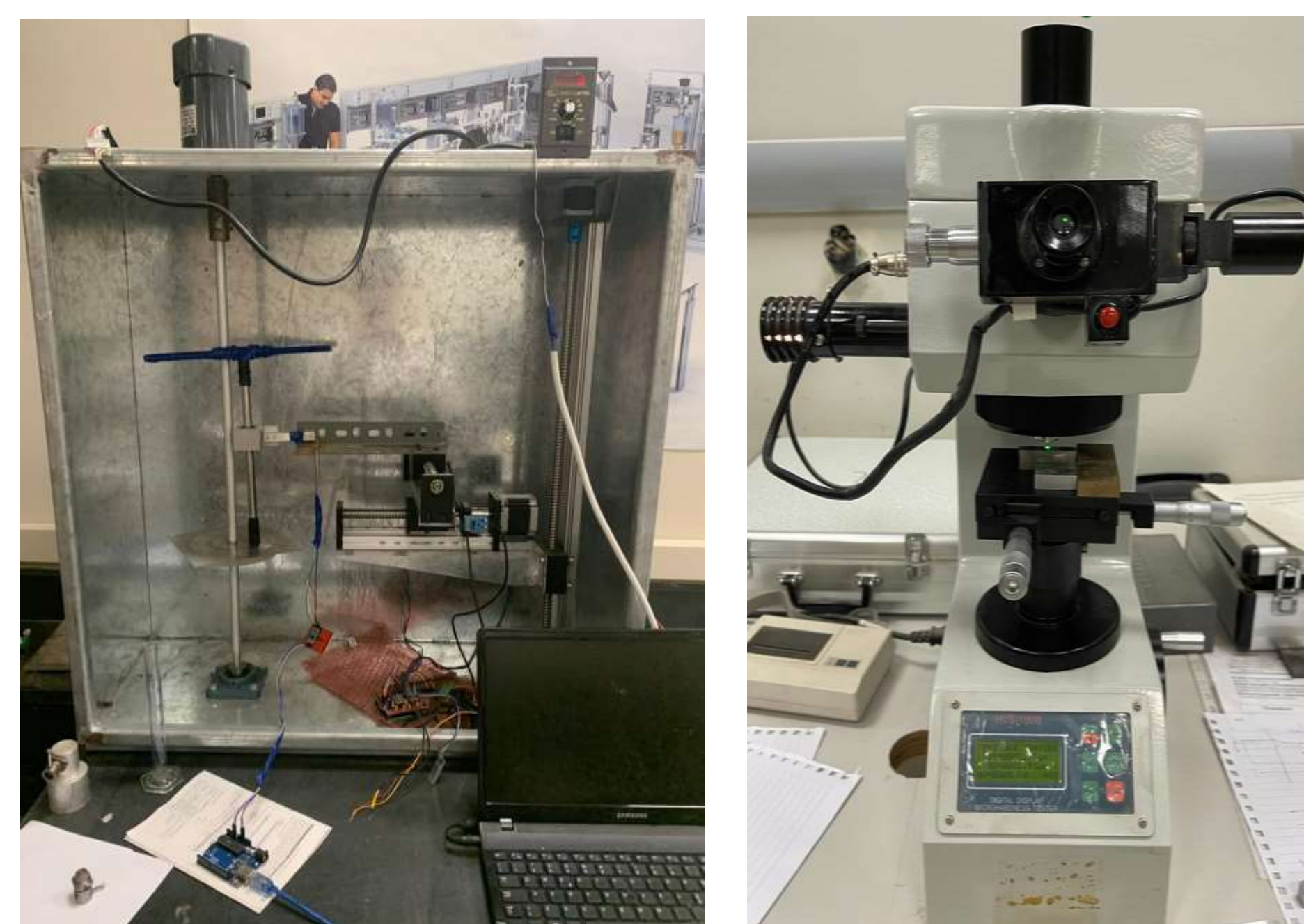
EXPERIMENTAL PROCEDURE



Vertical milling machine Clamping system Samples (a) one pass (b) two passes

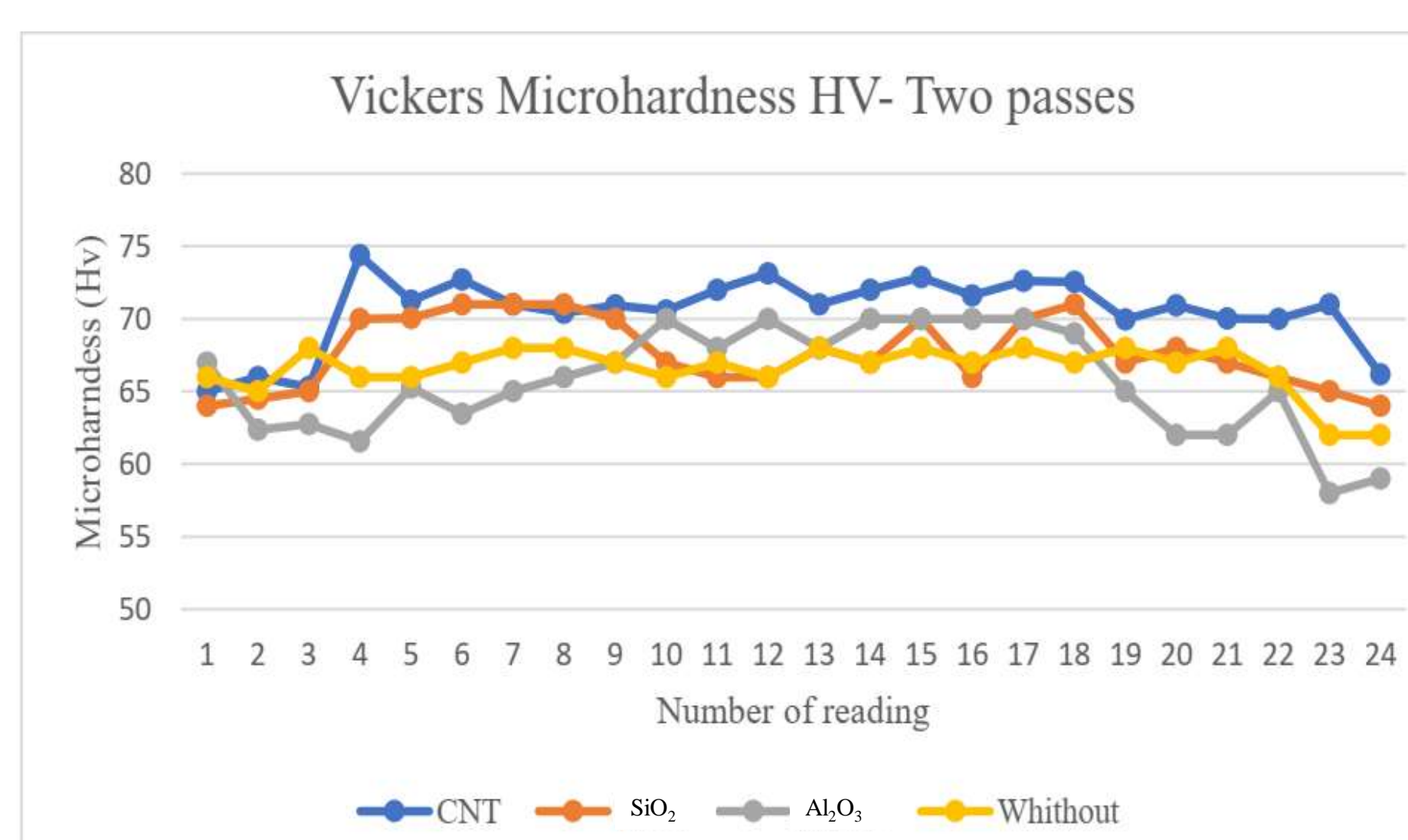
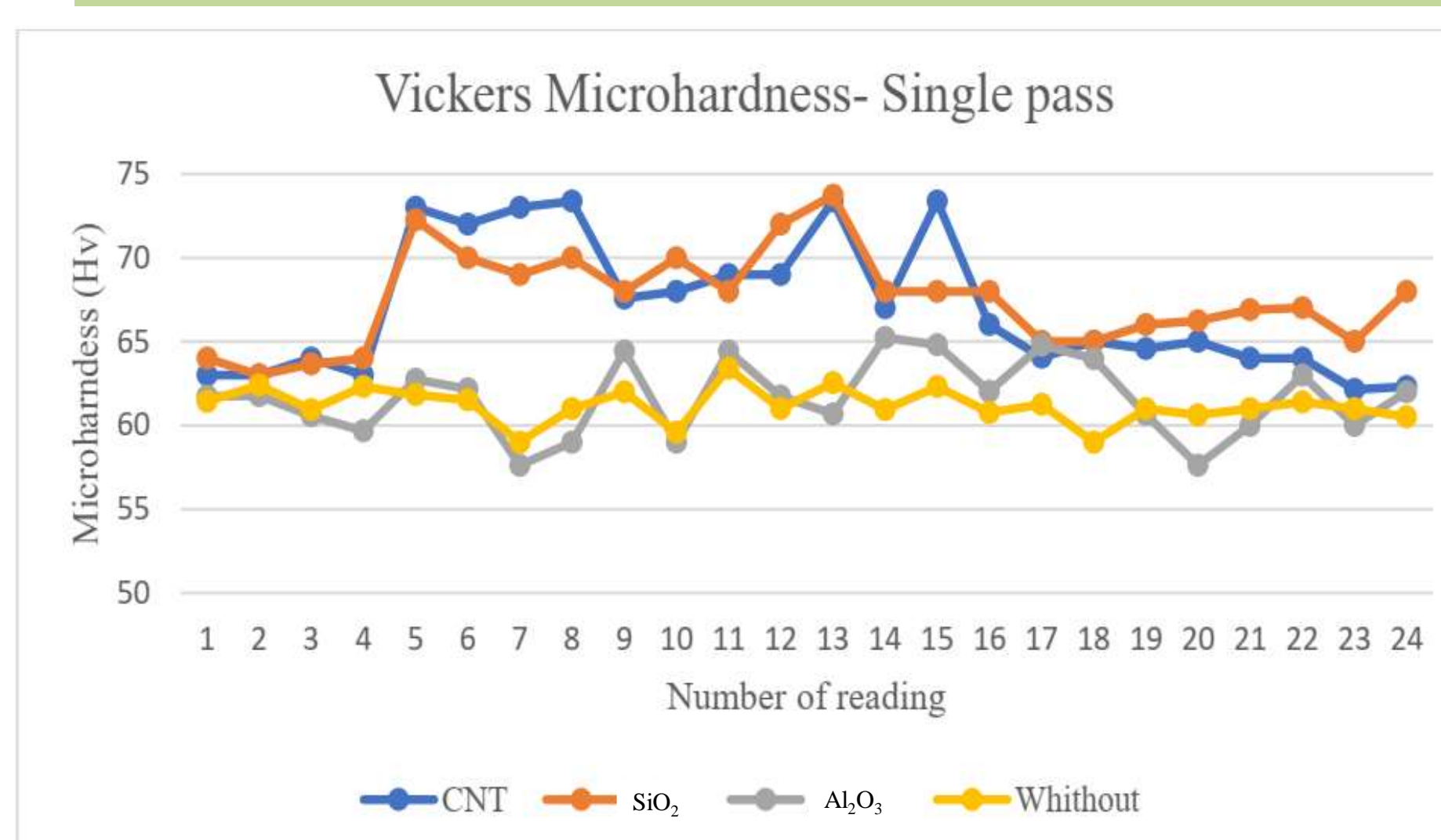


Samples for wear test Samples for hardness test

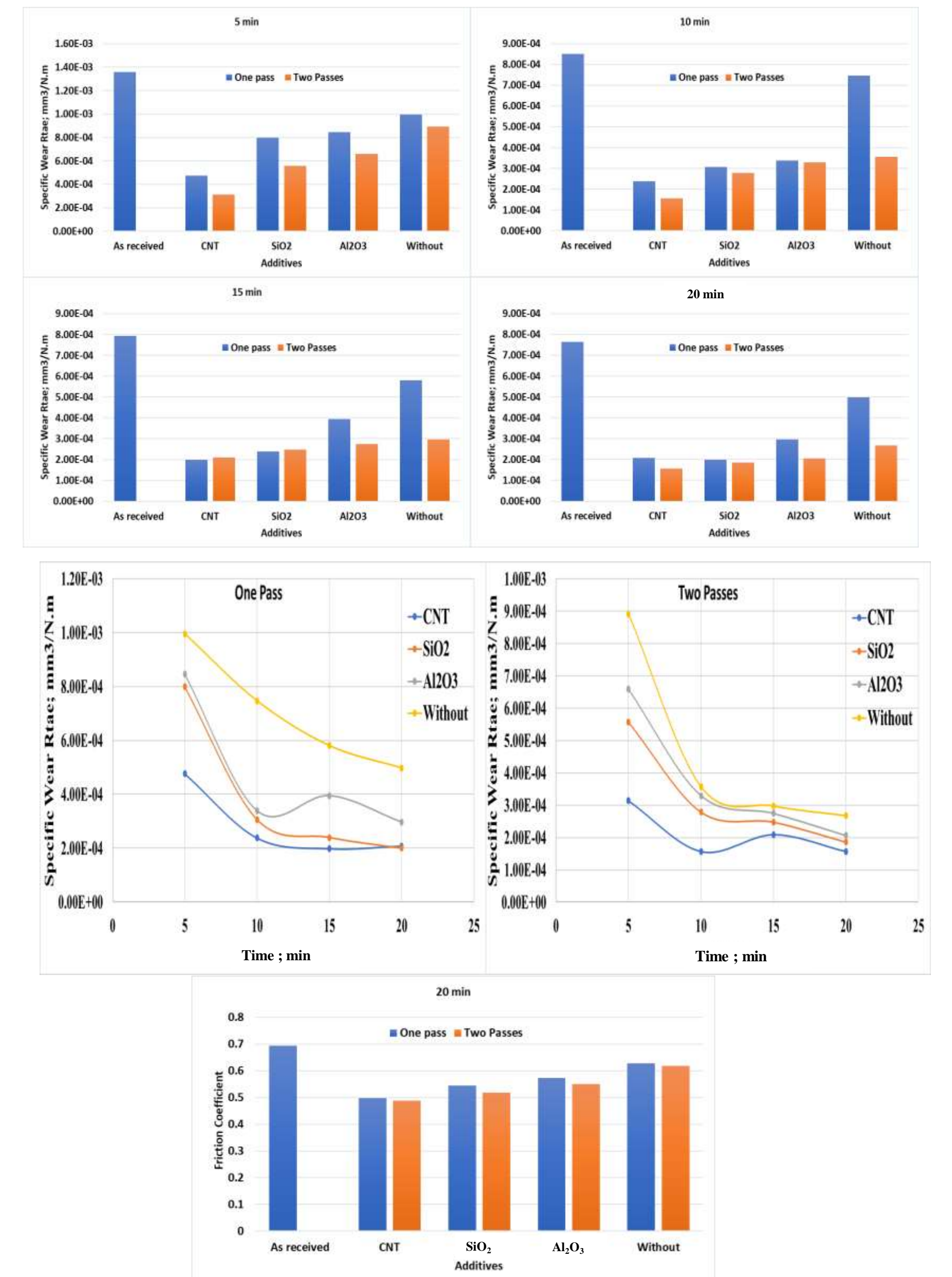


Pin-on-disk tribometer Digital hardness tester

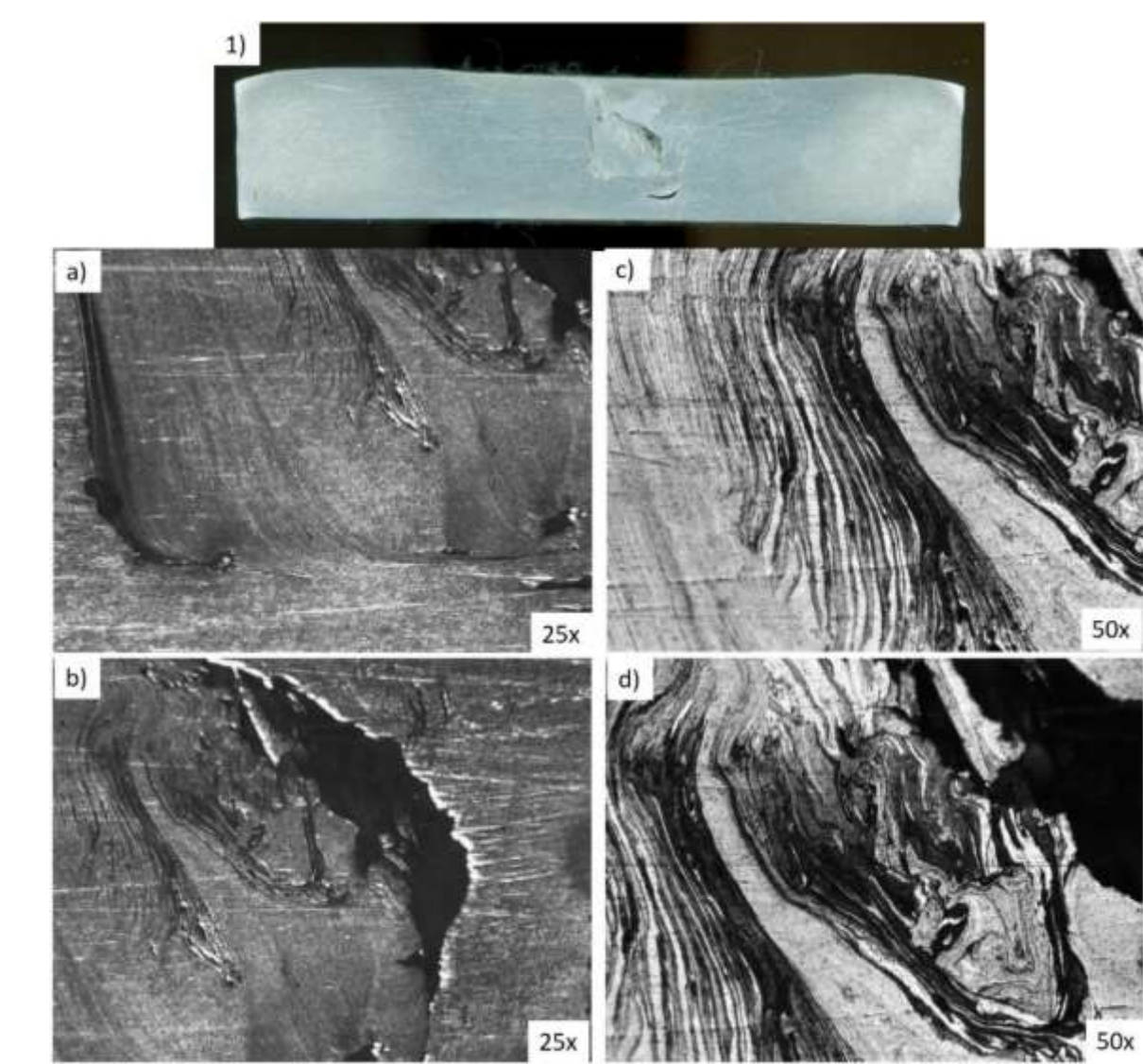
RESULTS OF HARDNESS



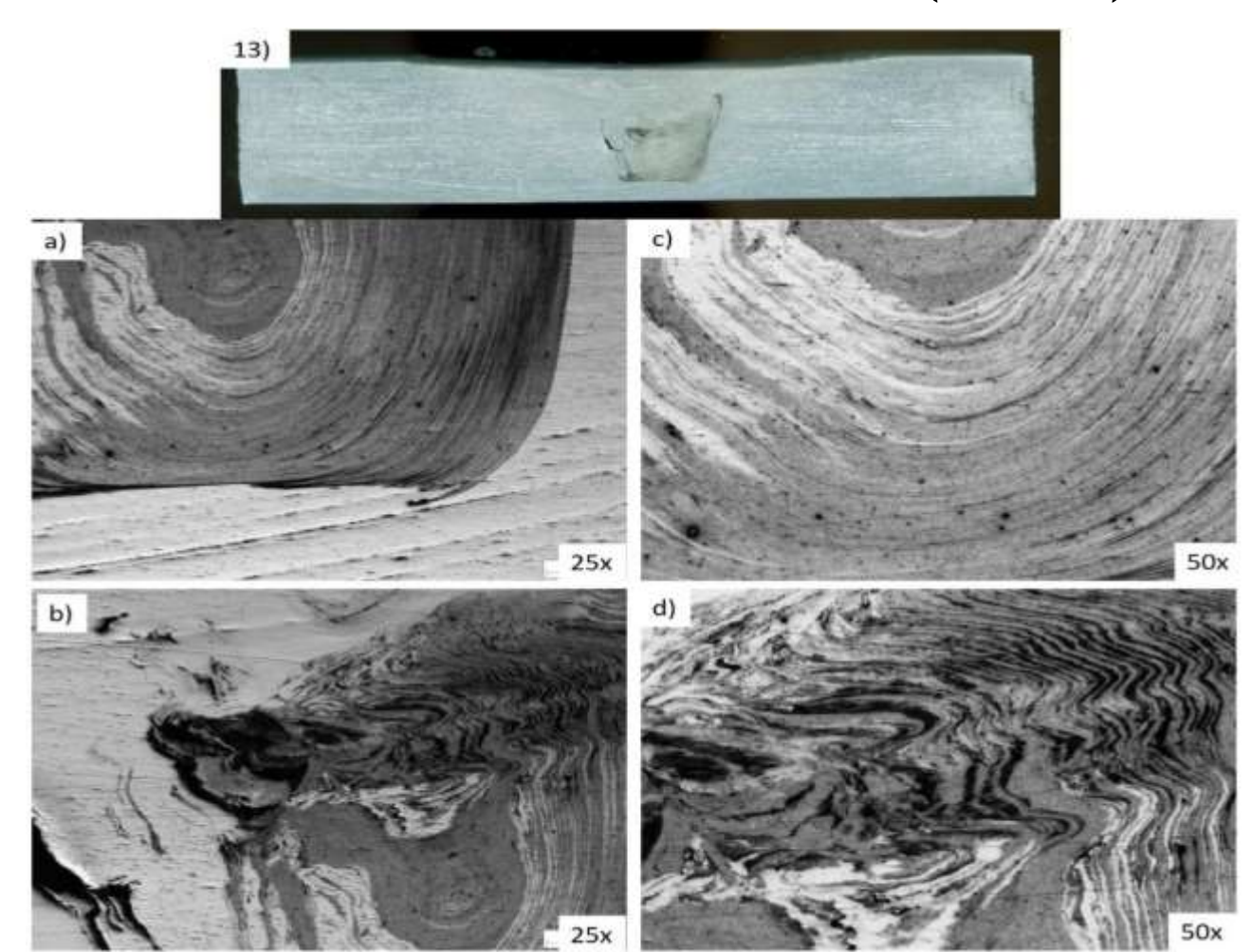
RESULTS OF HARDNESS



RESULTS OF MICROSTRUCTURE



Sample with triangle pin for single pass and with Carbon nano tube (CNT).



sample with triangle pin for two passes and with Carbon nano tube (CNT).

CONCLUSION

- ❖ The Friction stir processing(FSP) technique improves the mechanical properties of samples such as the hardness and wear resistance.
- ❖ Two passes improves the hardness and the wear resistance of the specimens because it makes the powder distribution and reduce the defects and agglomerations in samples.