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The Use of Artificial Intelligence on Construction Products Research

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Construction products are subjected to very strict quality controls before their use. However these controls specify a series of tests that are not immediately available in many cases. Such is the case of concrete, for which compression strength test must be done after a curing period of 28 days, or the wood-based panels for structural use that must pass testing for internal bond strength after the aging cycle of almost 21 days. Also, these tests require large and expensive testing machines equipped with load cells of up to 50KN, which are not always available in the manufacturer's own control laboratories (Figures 1 and 2).

This delay in obtaining results from testing is problem for the manufacturing industry in general, because it forces in many cases to maintain a stock product immobilized until the tests results are obtained.

Therefore it would be very useful for production control to have a tool that can relate the structural properties to other physical and mechanical properties that are more readily available, or to manufacturing parameters obtained from the production line in real-time. Recent artificial intelligence research has allowed glimpsing into new solutions to this problem. It is possible now to develop a series of high accuracy computer models that fit the needs of each manufacturing line, for example, steel, wood-based panels, concrete, or other materials (Figure 3).

These models do not only allow analysts to predict the results with a high accuracy. They also allow adjusting the parameters of production to optimize the production time or costs, or to develop new products. This is because once the model has been developed; it can act as a simulator of the production line itself, allowing to perform different tests without having to actually manufacture the product.

This technology can allow construction product manufacturers to increase the competitiveness of their products, by either reducing the delay in obtaining tests results, facilitating research on new products, or by reducing production costs through optimization.

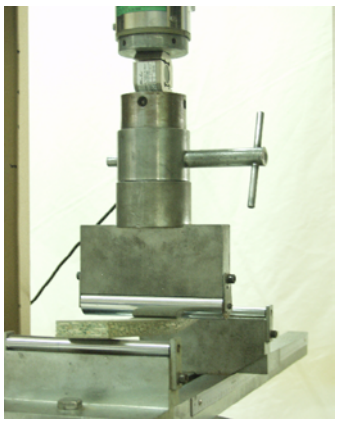

Figure 1: Bending strength test in particleboard for structural use.

Figure 2: Compression strength test in concrete.

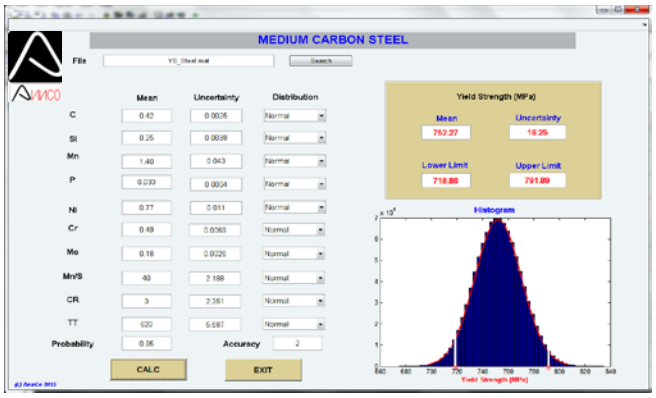

Figure 3: Computer simulation of yield strength test in carbon steel.

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