Fundamental analysis into properties affecting investment casting shell strength

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Abstract

This paper outlines the work carried out to understand the mechanisms which can affect the strength of a shell during drying within the foundry. As the Modulus of Rupture is the key parameter in question here, a Gauge R & R was carried out to understand the issues within the test method and optimize the method. Following this, the influence of inter coat dry time, final dry time and materials used were analyzed within this study.
It was found the thickness was the highest source of variability within the testing of MOR. This was a manual measurement which could contribute most to the variability within the test. Following training and establishment of clear procedures within the test, the variability was reduced further.
The analysis of drying indicated that polymer enhanced binder systems dramatically increased the strength developed at a shorter dry time. Furthermore, the green strength developed is also far higher for polymer enhanced systems, a key factor for reducing dewax related shell cracking.