SPONSORED RESEARCH

PROJECT TITLE: *Digital Active Clay Measurement in Green Sand*

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IMPACT: Reduced variability and improved simplicity of testing will allow for improved control of active clay in foundry green sands.

Technical Need

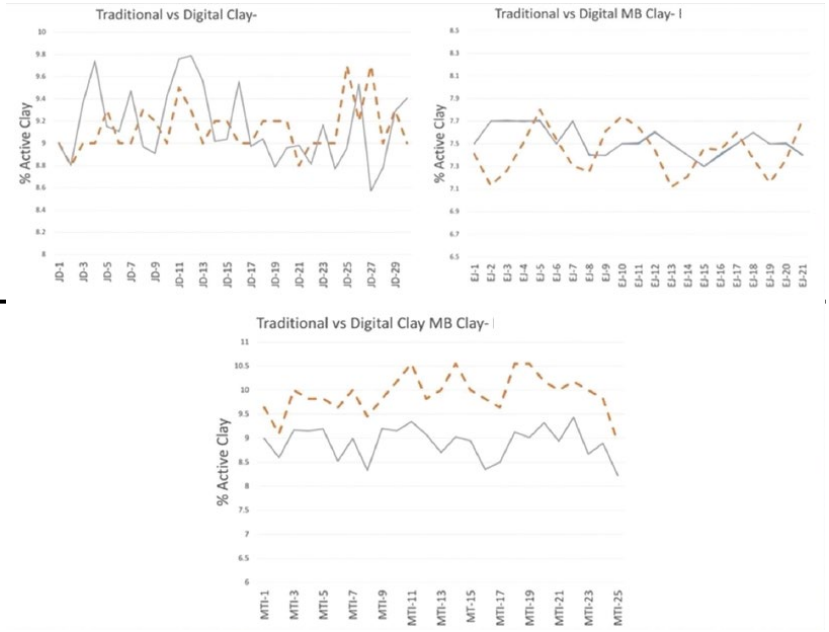
Measurement of active clay in molding sand is critical to control foundry green sand. The Methylene Blue Clay (MB) techniques employed by the foundry industry for measuring active clay suffer less than desired reproducibility. The test is subjective in nature due to the visual interpretation component which limits its accuracy internally between foundries.

Project Goal

Optimize the method for measuring active clay in green sands and implement it as a standardized method.

Technical Approach

Green sand samples from three foundries were evaluated to determine actual clay content. The same samples were tested via a new absorption technique. The new spectrophotometric procedure follows: 1) weigh and mix the green sand with the copper triethylenetetramine solution, 2) settle equilibrium, 3) filter the sand from the dye, and 4) determine spectrophotometric reading of the dye absorbance at a specific wavelength of 578 nm.



Active clay content comparison: New digital active clay readings are red dotted lines; traditional MB readings are gray solid lines.

Findings and Conclusions

The new spectrophotometric method for measuring active clay in green sand demonstrated that it worked well with low variability over the entire range of clay levels used in most foundries. This method was simplified by using filtration for separating the sand from the dye as opposed to centrifuging the sand as was used in previous work. Not only does this simplify the process of working well in foundries and lower sample measurement time, but it also eliminates the need to use a high-speed centrifuge, which is costly equipment that requires periodic maintenance.

This research study shows that the spectrophotometric measurement active clay test offers an enhanced alternative to the standard MB test. This new test is relatively simple to perform and requires less extensive training or experience than the standard MB test. The digital test also has lower startup and operational costs and can be completed in 10 minutes or less time. This test is also conducive to an automated operation, which may be explored further in subsequent research studies.

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