ENVIRONMENTALLY FRIENDLY FOUNDRY MOLDING SANDS AS A PART OF GREEN DEAL POLICY

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Abstrakt

Thanks to strict environmental regulations, improvements in energy efficiency, and the trend in European industry to move away from harmful technologies over the past few decades, the negative impact of European industry on the environment has improved. In order for the European industry to become more environmentally friendly in the future, it is necessary to implement new innovative technologies.

The total production of castings in CAEF countries in 2023 amounted to over 14 million tons, and a significant part of these castings were produced using sand molds and cores. Thus, the development of environmentally friendly molding sand technologies is an important part of the Green Deal policy. The aim of the paper is to analyze modern solutions for molding sands, both with organic and inorganic binders.

In molding sands with organic binders, the innovative approach of replacing part of the binder with biodegradable additives reduces the harmfulness of molding sand at the stage of casting production and contribute to solving the problem of hazardous post-regeneration dust utilization, which is crucial from waste management point of view. Another solution are molding sands with organic binders based on modified with furfuryl alcohol resins cured by hardeners with reduced sulfur content, which are less environmentally harmful and ensure production of high-quality ductile iron castings. Molding technologies with alkyd resins hardened by catalyst based on isocyanates and alkaline phenolic resin hardened by esters are a less environmentally harmful alternative to molding sands with commonly used in foundry practice furfuryl resin.

Molding sands with environmentally friendly inorganic binders based on sodium silicates and aluminosilicates were also analyzed. Molding sands with solid and hydrated sodium silicates with additives improving their knocking out properties can be used as well as new ester hardeners based on esters of carbonic acid and their mixtures with hardeners based on acetic acid used commonly in chemically hardened molding sands with hydrated sodium silicate.

Finally, due to the harmfulness of respirable dust from silica sand for foundry workers, various sand matrixes, including advanced synthetic ones, were analyzed, also for 3D printing of sand molds and cores.

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