ABSTRACT

The dissertation deals with the possible use of barley malt in moulding and core material technology as a binding material. The specific type of barley malt was selected on the basis of preliminary studies of several types of malts used in brewing. Five different barley malts were analysed, from which one grade was selected. The selection was based on preliminary studies of the strength and technological properties of the prepared masses and a cost analysis of the individual malts.

A TG/DTG analysis of the malt selected for the study was carried out, in which the thermal decomposition temperatures of its individual components were determined to determine the amount of organic compounds included in the barley malt analysed. The starch and protein contents of the binder, which are responsible for binding the prepared moulding compounds, were further determined. Technological and strength tests of masses prepared

technological and strength tests of masses prepared on the basis of barley malt binder were carried out. Uncured material and master samples intended for testing the mechanical properties of the analysed material were tested. Typical properties of moulding sands with a binder in the form of barley malt were determined on their basis. The effect of malt content on fluidity, permeability, strength properties and abrasion resistance was evaluated.

and abrasion resistance were evaluated. Based on the results, it was found that increasing the binder content in the mass increased strength and wear resistance,

in contrast to fluidity and permeability. An added value was the comparison of the mass with malt with other masses containing commonly used binder materials. The analysed material was also subjected to observation on an SEM microscope. Observation of the cured mass was carried out - before and after strength tests (bridges connecting the matrix grains were evaluated). It was observed that the barley malt binder forms smooth bridges connecting the individual grains of quartz sand. Smooth bonding bridges, due to the absence of so-called technological notches, are stronger than bridges characterised by a rough surface. In order to determine the suitability of the sand for casting purposes, castings were made and subjected to visual observation, microscopy and roughness analysis on reference samples and a profilometer. It was concluded from these that the addition of barley malt binder had a favourable effect on the surface quality of the castings. After casting, there was a tendency for excessive gas release during pouring, especially at higher binder contents in the bulk, which

could result in certain casting inconsistencies. It was also observed that higher amounts of barley malt caused an increase in the thickness of the mass layer that was burned through.