Dear reviewer,

thank you for your comments and suggestions for improving our manuscript. Based on your recommendations, we've edited the manuscript as follows:

Bašistová et al. have presented the manuscript titled: Dilatation of new progressive hybrid sand and its effect on surface structure, roughness and veining creation within grey cast iron. Overall presentation of the article is good. I have few suggestions for the authors about this article.

1. Abstract portion contains the long sentences of usually general discussion, this breaks the core concept what authors want to describe. I suggest the authors to rephrase the abstract with precise technical language to express their findings (result values).

   - *Abstract has been modified according to suggestion.*

2. Please change the caption of Table 1.

   - *The caption of Table 1 has been changed.*

3. Method section line 121, “sands used are characterized by high chemical purity and similar bulk density…” what methods are used by the authors to evaluate the purity of the sand? And how they have measured the density? I suggest the authors to calculate the porosity of the samples as well.

   - *Thank you for your comment, the text has been edited. The chemical purity here referred only to silica sand and was given by the supplier. Information about supplier's declaration, as well as a study indicating the SiO_2 content for Biala Góra silica sand, has been added to the text. In addition, general information including references regarding minimum SiO_2 content for foundry silica sands has also been added to the text of chapter 2.1.*

   - *Bulk density was performed during previous experiment. Information about resulted bulk density with refference was added to the text of chapter 2.1.*

   The methodology used: freely pouring the dried sample into a container of well-defined volume (graduated cylinder), where the sand sample was shaken to a constant height by vibration. The volume of the compacted sample was read using a ruler and the sample was weighed. The bulk density was then determined by the ratio of the sample weight to the actual sample volume in the container. At least 3 measurements were performed for each hybrid mixture.

   - *Porosity: very smooth core surfaces were achieved due to the fabrication of the cores using metal coreboxes. The surface defects (as deep penetration and veining) and increased roughness in the veining area investigated were related to the manifestation of the thermal dilation of the hybrid sand and the resulting braking stress, not to core porosity. For this reason, the calculation of core porosity was considered irrelevant to the experiment and was not included in the procedure.*

4. I suggest the EDS measurement is important to confirm the purity or authors should go towards XRD at least.

- It is true that the chemical purity of silica sand influences its thermal dilatation value, with high SiO_2 content leading to increased dilatation. However, due to the mixing of silica sand with CERABEADS artificial sand with a different chemical composition (aluminosilicate) to reduce dilation and stress defects, the initial chemical purity of the silica sand was not so important for the experiment and we worked with the supplier's certificate.

Information about supplier's declaration, as well as a study indicating the SiO_2 content for Biala Góra silica sand, has been added to the text of chapter 2.1.

5. As authors have added the roughness on the surface in the title, porosity and density plots are important.

- Bulk density of hybrid mixtures was performed during previous experiment. Information about resulted bulk density with reference was added to the text of chapter 2.1.

- The surface roughness investigated was assessed in terms of stress defects caused by thermal expansion of the sand, where increased roughness can be the mildest manifestation and often accompanies veining. As increased surface roughness can also be a manifestation of overly coarse-grained sand, sparse (i.e. porous) cores, with liquid metal penetrating the intergranular spaces, an attempt was made to minimise this cause by producing cores by ramming into metal cores, whereby a highly dense and smooth surface layer is achieved. The use of a reference core coated with a protective coating was also adopted, which also serves as a protection against metal penetration into the sand and to increase the smoothness of the cast surface. For this reason, no assessment of the porosity of the core was undertaken.

The information has been added into the text of chapter 2.2.

6. Fatigue measurements like the exposure to water or open environment effect are important for this study.

- Thank you for the suggestion. In the event that veining, penetrations or other stress defects appear, even in a small scale, on the available surfaces, these defects are repaired by extensive grinding. In that case, the surrounding surface layer and cast structure is removed. If these defects occur in inaccessible areas (internal surfaces of narrow cavities, e.g. valve casting), these defects cannot be effectively removed by grinding and the casting is discarded as a scrap piece. In both cases, knowledge and solutions to the fatigue behaviour of the cast surface in the area of these defects when exposed to water or environmental effects (e.g. corrosion rate) are then completely irrelevant. The object of the experiment was to avoid or reduce the occurrence of these defects in general. For this reason, this measurement was not included in the experiment.

The information has been added to the chapter 4.

7. In Figure 3, there is strong variation for the softening of sample CB-95, please provide the reason of such variation?

- Thank you for your comment. After checking, an error was found in the rewriting of the numerical result. The increase in the occurrence of veining in the case of 40% CB-95 should not have been so high. Correction has been made in the text and graph.

Reasons for cracking of samples: in Figure 3 for CB-95 samples it is not softening of the samples, but cracking of the samples (cores) due to stress caused by the volumetric change of the cores during casting that allowed the metal to penetrate these cracks.
The addition of 20% CB-95 replicates the dilation pattern for a pure 100% BG27 sample, just with less dilation. With the gradual addition of CB-95, although the stresses decreased, the steepness of the volume change (steeper dilation curve with a steep increase from the beginning) increased during the β↔α SiO_2 conversion around 573°C for the 30% and 40% CB-95 samples, as shown in the dilation graph. The 50% CB-95 sample exhibited the most gradual volume change, despite the fact that the resulting dilation value was almost identical to the 30% and 40% CB-95 samples. This is explained by the suppression of the typical manifestation of high SiO_2 content under thermal loading, i.e., abrupt and sudden volume change, by the high degree of its replacement by sand with low dilatation. Here, although dilation was higher at low temperatures, it was gradual (more linear curve) and the volume change during phase transformation was not as high.

8. Mostly at 40%CB content there comes the change in trend of roughness and softening, is there some specific reason for that?

- In the case of the addition of 40% CB, there was a shift of the temperature of the beginning of the phase transformation by several degrees higher (a little differently for each mixture) compared to the mixture of 20-30% CB, and the mixture retained a sharp volume change. In the case of 50% CB, this temperature was also shifted, but the volume change was slower and reached lower values at the phase transformation temperature. This is evident from the dilation graph.

We hope that you will find our edits to be a step towards improving the submitted paper.

Kind regards

Martina Bašistová