Dear reviewer:

Thank you very much for your valuable suggestions and comments on our paper. We have revised the paper and the responses to your comments are listed below.

Best regards

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Reviewer 2: I have read your manuscript with attention and great interest. The subject is needed and up to date. During the reading, a few comments came to my mind that may complement your work.

(Q1) Title: Change “Heat-Treatment” to “Heat treatment”.

→ [Answer]: We have made changes in the title.

(Q2) Although the Introduction chapter is written correctly, it is not very long and can be extended by citing current works from Coatings, which can certainly contribute to a better discussion in the field of coating cavitation erosion. MDPI Publishing House is known for publishing sequences of articles on similar subjects. I am convinced that participation in this is beneficial for the authors. Over the past two years, the following papers have been published that can be a source of information for Introduction and Summary.

https://doi.org/10.3390/coatings8070254
https://doi.org/10.3390/coatings9090534
https://doi.org/10.3390/coatings9050340
https://doi.org/10.3390/coatings8100346
https://doi.org/10.3390/coatings8090307

→ [Answer]: We have added some discussion on cavitation erosion of HVOF sprayed coatings in Introduction: “Ding et al. observed that HVOF prepared nanostructured WC-12Co coating exhibits the excellent cavitation erosion resistance due to the dense
microstructure, low porosity as well as high fracture toughness of the coating.”

We have carefully reviewed the articles published from Coatings in recent years and quoted three articles to better discuss the research status of coating cavitation erosion in Introduction chapter. The references cited are as follows:


(Q3) I have one big remark to the erosion model - it is very general. Please specify it - it suits every spray coating and every layer with defects - even to a surface weld (Fe-WC or Ni-WC type, after all, there may also be cracks and pores).

→ [Answer]: In this paper, the cavitation erosion model mainly highlights two aspects (levels) of cavitation erosion process: the first aspect (level) is the main cavitation erosion behavior caused by vibration horn, resulting in crack propagation, spalling of hard phase and unmelted particles on the surface of the coating. The second aspect (level) describes the tiny bubbles generated by the erosion process of the first level attracted to the pores or cracks, and then grew and collapsed. The “secondary cavitation erosion” further destroys the structure of the coating. Based on the “secondary cavitation erosion”, the layer-like eroded characteristic which can be observed from Fig. 11(a) was formed. Most of the previously reported literature focus on the first level of the cavitation erosion mechanism (for example, research of “Cavitation erosion and jet impingement erosion behavior of the NiTi coating produced by Air Plasma Spraying”, Coatings 2018, 8, 346; doi: 10.3390/coatings8100346), this paper constructs the cavitation erosion model from these two levels.

(Q4) From the presented research and their results, you can certainly draw more valuable conclusions, highlight work novelty. In its present form, the article is primarily a research report. The conclusions should be rearranged so that they describe specific results obtained in the thesis. In their present form, they are rather generally formulated, well-known statements, suitable for any type of spray coating.

→ [Answer]: We have carefully combed and re-organized the conclusions, and the revised conclusions are as follows:

1. The volume loss of as-sprayed, HT 650, HT 800, HT 950 and HT 1100 coating after 6 hours of cavitation erosion test was 4.87, 2.71, 1.72, 3.67 and 6.01 mm³ respectively, which means that the coating heat-treated at 800°C exhibits the best cavitation erosion resistance.

2. The cavitation rate of the coating is closely related to the micro defects of the coatings such as pores, cracks, unmelted or semi-melted particles and phase transition occurred during the heat treatment process.

3. The surface roughness Ra of as-sprayed, HT 650, HT 800, HT 950 and HT 1100 coating after 6 h cavitation erosion was 15.343, 10.545, 8.695, 12.952 and 21.573 μm, respectively. The
surface roughness is positively correlated with the cavitation erosion rate, which indicates that the surface roughness can be used to quantitatively evaluate the cavitation erosion behavior of materials.

4. The existence of debris, unmelted particles and hard phases, as well as the propagation and connection of cracks and pores in the coatings are the dominant cavitation erosion mechanisms.

Detailed remarks:

(Q5) Table 1: change L/h to l/h and value to Value

→ [Answer]: We have changed “L/h” to “l/h” and “value” to “Value” in Tab.1.

(Q6) Line 52: “Commercial WC-12Co powder was used as feedstock for HVOF spray”. This statement is too general. Please provide a detailed description of the powder.

→ [Answer]: We have changed the original statement to “Commercial WC-12Co powder (Precursor (Yiyang) Plasma Powders Co., Ltd, China) with a nominal size distribution of -45 to +15 μm was used as feedstock for HVOF spray. The chemical composition (in wt.) of the powder was: 11~13% Co, 5~5.6% C and W as the balance.”

(Q7) Line 59: The description of the spraying process also requires a broader, deeper description. What were the dimensions of the samples? What is the chemical composition of the substrate?

→ [Answer]: The size of the sprayed sample was described in Section 2.2 (The sprayed samples were then machined into round specimens with a diameter of 16 mm.). We have added the chemical composition and the initial size of the substrate to Section 2.2. The modified description was “The 16Cr5Ni steel had a nominal chemical composition (in wt.): 0.03% C, 0.35% Si, 0.65% Mn, 15~17% Cr, 5.5~7% Ni, 0.03% P, 0.01% S, 0.5~1% Mo and Fe as the balance. The initial size of the substrate was 80 × 50 mm.”

(Q8) Line 63: Have the surface roughness values of the steel been measured before and after sand blasting?

→ [Answer]: Yes, the surface roughness values of the substrate were measured before and after sand blasting. The surface roughness Ra before and after sand blasting was about 1.6 and 3.1 μm, respectively.

(Q9) Figure 6: Please fill in the information on what error the error bars show. Standard deviation?

→ [Answer]: Yes, the information on error bars in Fig.6 is standard deviation. We have explained the relevant information in the revised manuscript: “The standard deviation is adopted as error bar”.

All of the above questions have been modified in the manuscript.