

## PhD dissertation evaluation report

Reviewer: Dorina Kovacs, PhD

The dissertation explores the wear behaviour of CVD-coated tool steel, comparing single-layer and multilayer coatings, with a particular focus on tests involving zirconium balls. The topic is timely and relevant, and the research conducted meets the requirements for a doctoral-level study. The candidate performed various analyses, including wear testing, hardness measurements, surface roughness evaluation, and oxidation testing. However, these methods do not fully replicate the conditions of actual cutting operations.

The dissertation, including a brief appendix, consists of 120 pages, which falls within the expected range for a PhD thesis. The language used in the text is appropriate for an academic work of this level. Previously identified misspellings and citation errors have been corrected. Figures and diagrams are generally well-structured and informative; however, in some cases, labels cannot be seen well (e.g., Figure 38). The terminology, particularly concerning the "ball-on-disc" test, has been revised and is now used correctly throughout the thesis.

The thesis statements have been revised according to prior feedback and are now acceptable. Additional observations and questions for consideration are as follows:

- Figure 34 presents an elemental line scan of the worn surface; however, the data remains noisy. In particular, Figure 34a shows a high value, though it is unclear where the measurement was taken. This should be clarified by marking the scan line on the figure. The same issue applies to Figures 35 and 37.
- What is the explanation for the increase observed at the end of the curve in Figure 36?
- A modification to the thesis title was previously suggested. If the candidate could define "cutting efficiency" in a way that does not use actual cutting tests, the title would be considered acceptable.
- Regarding the oxidation test, the candidate stated that *during the first five cycles, the oxidation time was 2 minutes per cycle; the sixth cycle had a duration of 10 minutes, and the seventh cycle was extended to 20 minutes*. How could the candidate decide the oxidation test method? Is it based on a standard procedure? Furthermore, does the type of oxide formed on the surface influence the interpretation of results, and has this been considered in the analysis?

### Recommendation:

Despite some remaining points requiring clarification, the dissertation demonstrates a solid level of scientific rigor and contributes meaningful insights into the wear behavior of coated tool steels. The candidate has shown the ability to conduct independent research, apply appropriate methodologies, and engage with relevant scientific literature.

In light of the above, and considering the overall quality of the research and written presentation, **I recommend that the dissertation be accepted as part of the requirements for the doctoral degree.**

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