

## **Model-Based Design of Abrasion Resistant Materials – How Close Are We?**

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### **Abstract**

It has been known for a very long time that abrasion resistance and hardness, and thus indirectly microstructure, are closely related. The early work by Kruschov in Moscow in the 1950es served to make a closer link between abrasion resistance by hard abrasives and metallic hardness and later work has made qualitative extensions to also include work hardening and some specific microstructural features, especially the presence of large hard particles. In this overview the author attempts to evaluate how close we are at the present time to be able to design abrasion resistant materials microstructures for specific abrasive applications and how close we are to be able to do actual life-cycle design for such applications. Such design capabilities will become increasingly important as the emphases on resource conservation and materials cradle-to-grave usage increase in future years. Focus here is on relatively simple metallic alloy microstructures. In general, it is found that in spite of the large number of research papers on abrasive wear and the existence of several wear models, the quantitative underpinnings for materials design and life cycle design in this area is somewhat lacking. Some avenues for future research are suggested.