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„Mechanical Modelling of Powder Compaction"

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Cutting tool inserts, for instance used in steel machining, have the requirement to be tough and are therefore most often manufactured of cemented carbides, using powder metallurgy.
In this presentation, mechanical modelling of powder compaction in general and cemented tungsten carbide in specific will be discussed. Because of the amount of powder granules in a typical insert geometry, the mechanical behavior is modelled with a continuum approach, using the finite element method (FEM). Sensitivity studies show that measurements of the local density are needed in order to determine and verify material properties. Since the analyzed powder contains tungsten (W), which has high atomic number, a polychromatic beam of thermal neutrons was needed to penetrate the powder samples. It is shown that the local density can be measured with 3D imaging and a thermal neutron source.