

Using neutrons to study cemented carbides for cutting inserts

Swedish company Sandvik Coromant produces the latest cutting tools and inserts. These are made using pressed powder materials like cemented carbides, for example tungsten carbide, which are then sintered to make them into a very hard material.

THE PROBLEM TO SOLVE

Pressed powder blanks shrink and change geometry during the sintering process because of density variations in the material. This could then make the cutting tool or insert no longer useable for its purpose. Therefore, it is important to measure this variation accurately. A method commonly selected is x-ray tomography but this technique cannot be used in cemented carbide powder compacts with tungsten because tungsten strongly absorbs x-rays and samples cannot be penetrated.

A STEP TOWARDS THE SOLUTION

Neutron radiation has a high penetration depth and can be used to determine the density distribution in a material. Neutrons offer an alternative for materials containing tungsten, lead or other metals.

Along with their collaborators at the Royal Institute of Technology in Stockholm, Sandvik's researchers performed radiography at the Léon Brillouin Laboratory in France and tomography at the Budapest Neutron Centre in Hungary on one of their powder compacts.

THE RESULT

Qualitative radiographs were obtained revealing areas of high and low density within the insert (Fig. 2). This study demonstrates that using neutrons to determine the density variation in powder compacts with tungsten is a viable option.

"The measurements clearly show that the density distribution in a powder compact with tungsten can be measured using neutron tomography. This will provide us with new insights into the design of the production process."

Hjalmar Staf, Material Scientist, Sandvik

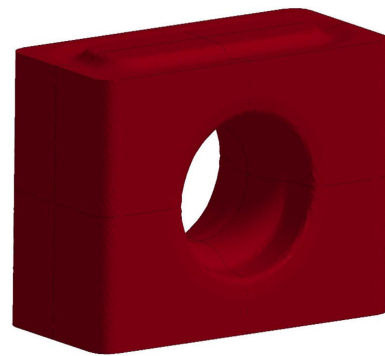


Fig. 1 The powder compact geometry used for the study

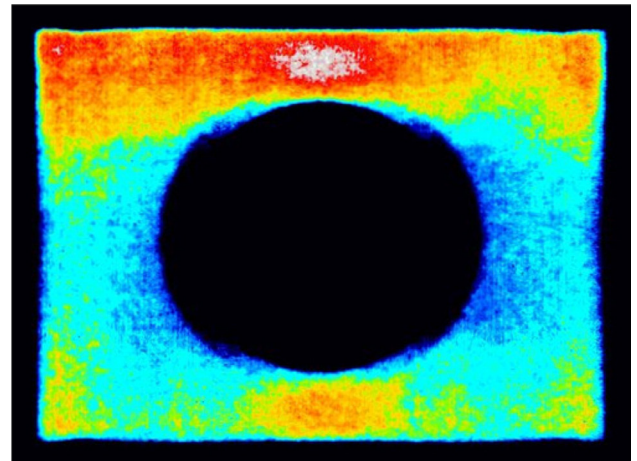


Fig.2 Colour coded radiograph. The darker areas above and below the hole corresponds to a high value on the density and the lighter areas left and right of the hole to a low value.

NEUTRONS FOR INDUSTRY

industry@sine2020.eu

SINE2020 Industry Consultancy is now open for requests

Proof-of-concept experimental beam time is being offered to Industry!

RAPID ACCESS

Fast-stream processing for industrial applications, optimising result lead times.

CONFIDENTIALITY

Activity covered by non-disclosure agreements. Only company name and measurement type to be published.

FLEXIBLE SERVICES

In many cases industrial processes and conditions can be re-created in the test laboratory. Final data analysis and reporting are provided.



EXPERT CONSULTANCY

Industrial R&D professionals in collaboration with experienced specialists from European neutron centres.

PARTNERS

Czech Republic
France
Germany
Hungary
Netherlands
United Kingdom



SINE2020 receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 654000.

