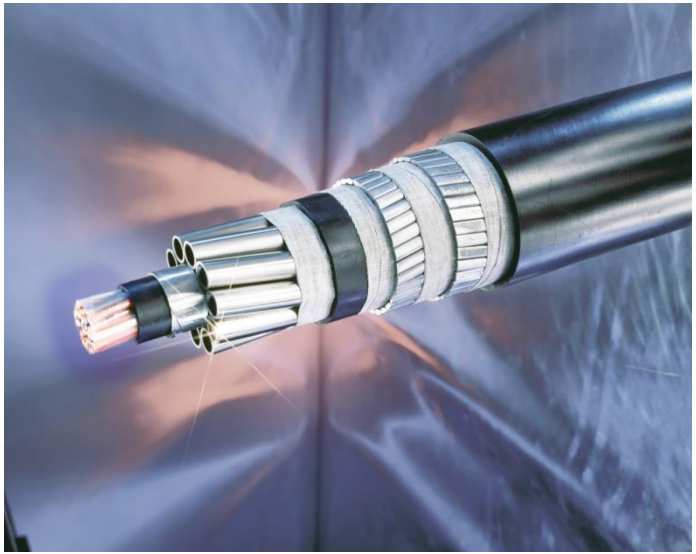
INDUSTRIAL USE OF LARGE RESEARCH FACILITIES THROUGH ACADEMIC COLLABORATION

LARS JOHNSON

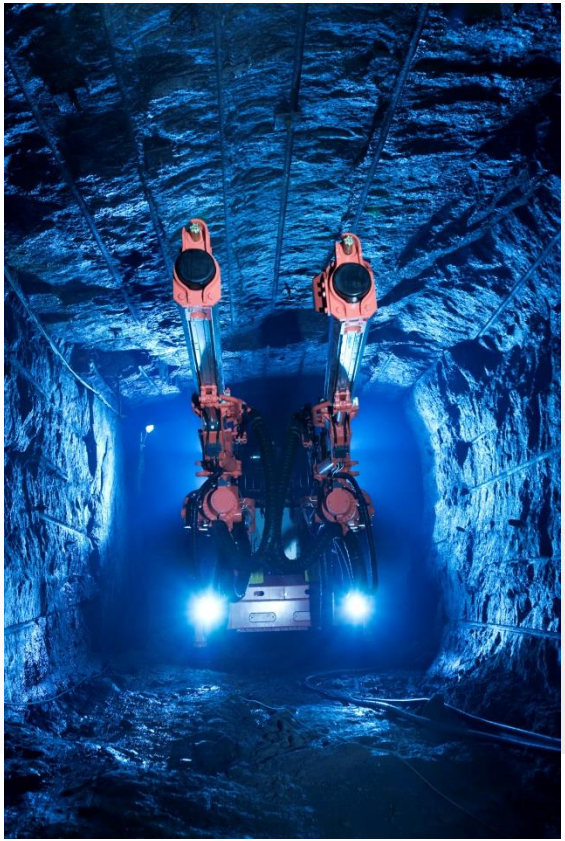
SANDVIK MATERIALS TECHNOLOGY

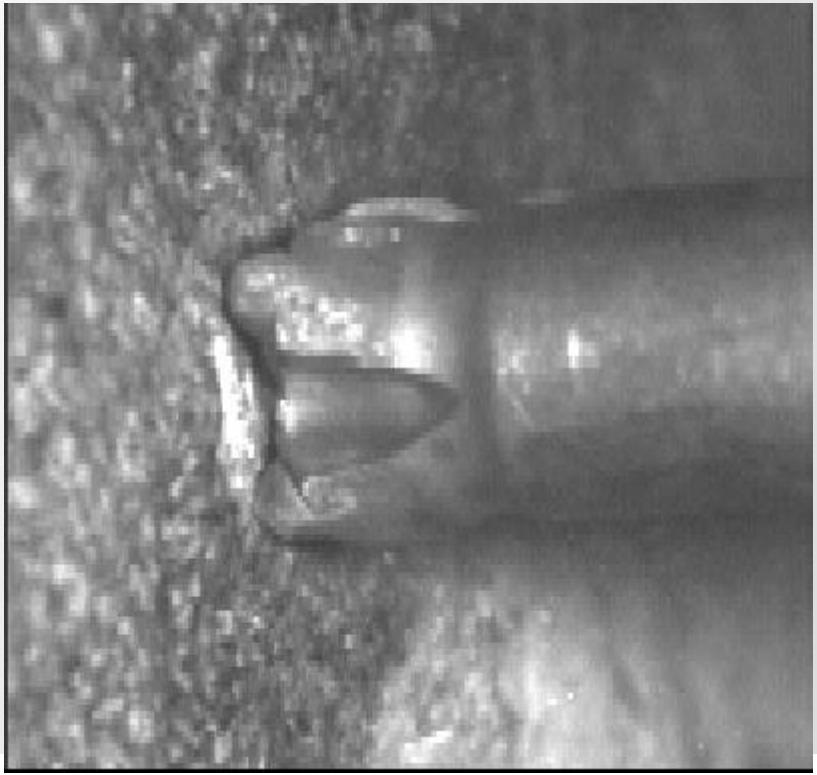
Urea plant



Tubes for umbilicals

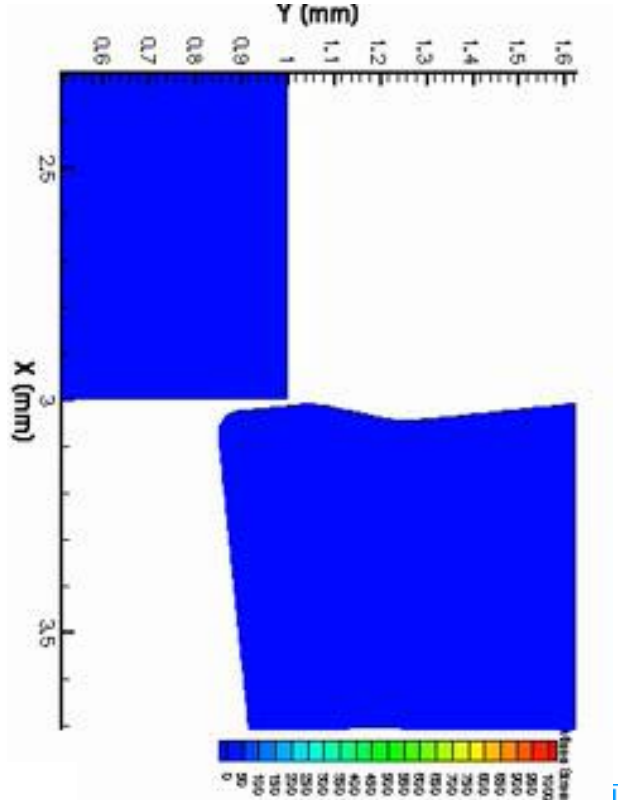
SANDVIK MINING AND ROCK TECHNOLOGY





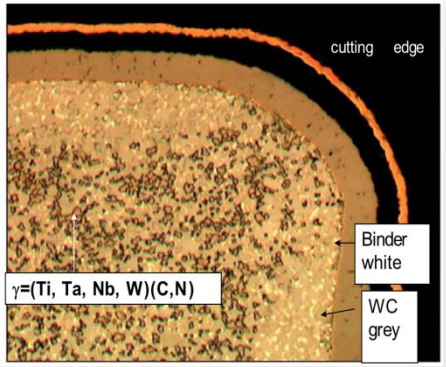
SANDVIK MACHINING SOLUTIONS

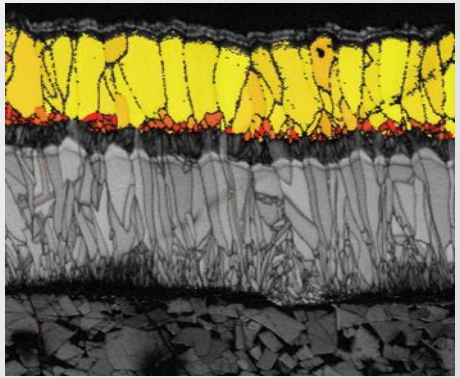
High forces and temperatures

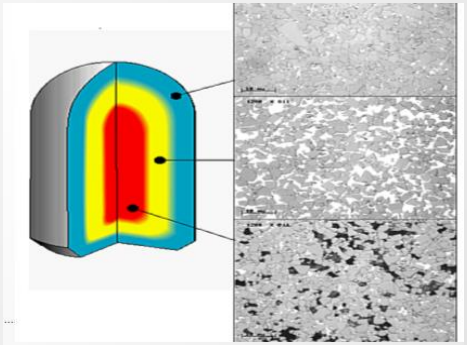


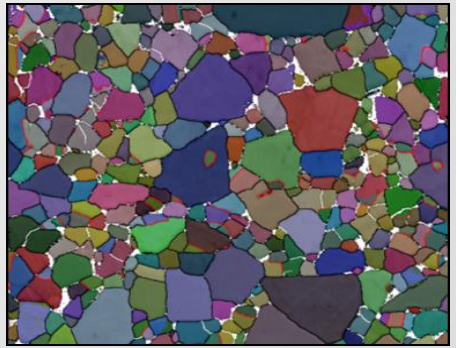
SANDVIK Coromant SECO WALTER

CEMENTED CARBIDE TOOLS









SANDVIK

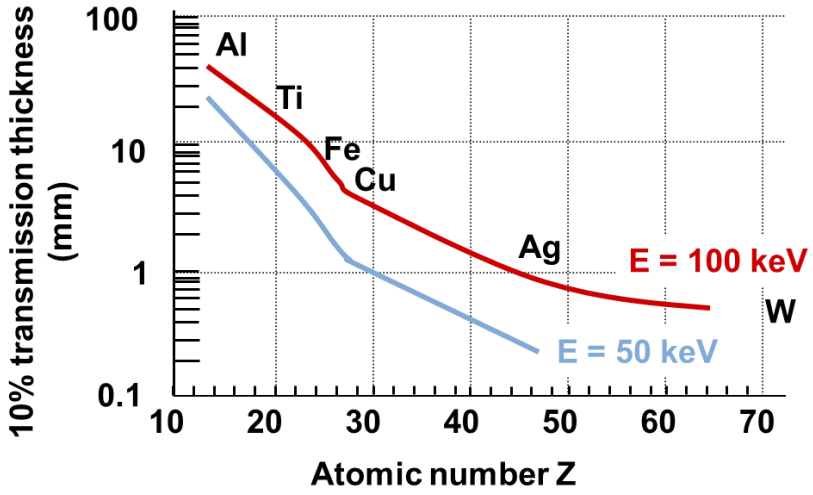


Table 1. Comparison of Neutron and X-Ray Scattering and Absorption Characteristics (X-ray f and μ values calculated for CuK_α at $\sin\theta/\lambda = 0.5$)

COMPARISON OF NEUTRON AND X-RAY SCATTERING AND ABSORPTION CHARACTERISTICS

	NEUTRONS			X-RAYS		
	b	μ	†50%	f	μ	†50%
ELEMENT	(10^{-12}cm)	(cm^{-1})	(cm)	(10^{-12}cm)	(cm^{-1})	(cm)
C_{Gr}	0.66	0.62	1.11	1.69	9.6	0.72×10^{-1}
Al	0.35	0.10	7.05	5.69	131	0.53×10^{-2}
Ti	-0.34	0.45	1.55	9.12	938	0.74×10^{-3}
V	-0.05	0.56	1.25	9.63	1356	0.51×10^{-3}
Cr	0.35	0.47	1.47	10.1	1814	0.38×10^{-3}
Fe	0.96	1.12	0.62	11.5	2424	0.29×10^{-3}
Co	0.25	2.40	0.29	12.2	2980	0.23×10^{-3}
Ni	1.03	1.86	0.37	12.9	407	0.17×10^{-2}
Mo	0.69	0.48	1.44	21.6	1618	0.43×10^{-3}
W	0.47	1.05	0.66	42.3	3311	0.21×10^{-3}

SANDVIK AT ESRF

THESIS

High temperature deformation mechanisms of cemented carbides and cermets

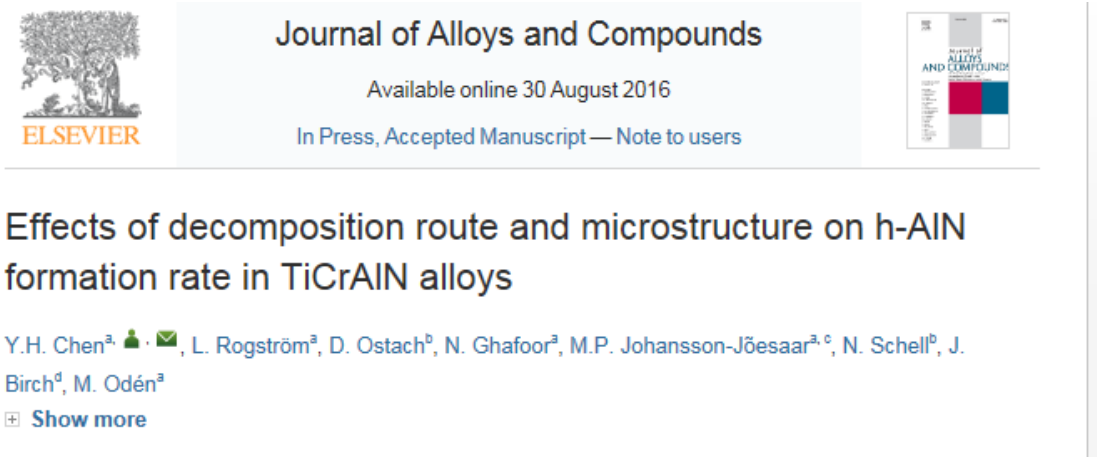
Buss, Katharina
Advisor: Benoit, Willy

Lausanne: EPFL, 2004

The motivation of this work derives from the need of the cutting tool industry to improve its products in order to support harder and harder working conditions, namely increasing cutting speeds and working on stronger modern materials. The lifetime of the tools is limited by plastic deformation that occurs at the cutting edge under working conditions, which involve high temperatures and stresses. The high temperature deformation of the materials that are used for the production of cutting tools is studied. Two base materials are chosen, a WC-Co cemented carbide and a TiWCN-Co cermet, with the same amount and composition of the cobalt binder. The experimental strategy combines macroscopic deformation tests by three-point bending with microscopical observation and mechanical spectroscopy. We also analyze residual stresses and crystal structure as a function of temperature by neutron and X-ray diffraction. By three-point bending, the transition temperature at which,

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

SANDVIK AT PETRA III



ELSEVIER

Journal of Alloys and Compounds

Available online 30 August 2016

In Press, Accepted Manuscript — Note to users

Effects of decomposition route and microstructure on h-AlN formation rate in TiCrAlN alloys

Y.H. Chen[a], L. Rogström[a], D. Ostach[b], N. Ghafoor[a], M.P. Johansson-Jõesaar[a, c], N. Schell[b], J. Birch[d], M. Odén[a]

Show more

- *In-situ* x-ray scattering measurements during annealing above 1000 °C.
- Activation energy of h-AlN formation in TiCrAlN determined.
- Decomposition route and microstructures influence the activation energy.

LINKÖPINGS UNIVERSITET

SANDVIK

SANDVIK AT BESSY

SANDVIK Coromant

HZB Helmholtz Zentrum Berlin

ELSEVIER

International Journal of Refractory Metals and Hard Materials

Volume 56, April 2016, Pages 27–34

In-situ high temperature stress analysis of Ti(C,N) coatings on functionally graded cemented carbides by energy dispersive synchrotron X-ray diffraction

José García[a], Haroldo Pinto[b], Esteban Ramos-Moore[c], Carlos Espinoza[c], Jonas Östby[a], Rodrigo Coelho[a,1]

[a] AB Sandvik Coromant R&D, Lerkrogsvägen 19, SE-12680 Stockholm, Sweden

Appl Cryst JAC JOURNAL OF APPLIED CRYSTALLOGRAPHY

ISSN 1600-5767

Received 10 November 2016
Accepted 28 December 2016

Nondestructive separation of residual stress and composition gradients in thin films by angle- and energy-dispersive X-ray diffraction. II. Experimental validation

Manuela Klaus,[a]* Christoph Genzel[a] and José García[b]

[a]Microstructure and Residual Stress Analysis, Helmholtz-Zentrum Berlin, Albert-Einstein-Strasse 15, Berlin 12489, Germany, and [b]R&D Materials and Processes, AB Sandvik Coromant, Stockholm, Sweden. *Correspondence e-mail: klaus@helmholtz-berlin.de

SANDVIK - LOS ALAMOS (NEUTRONS)

ELSEVIER

International Journal of Refractory Metals and Hard Materials

Volume 27, Issue 2, March 2009, Pages 282–287

International Conference on the Science of Hard Materials - 9

Measurement of residual thermal stress in WC–Co by neutron diffraction

D. Mari[a], B. Clausen[b], M.A.M. Bourke[b], K. Buss[a]

[a] Ecole Polytechnique Fédérale de Lausanne (EPFL), Institut de Physique de la Matière Complexe, CH-1015 Lausanne, Switzerland

[b] Los Alamos National Laboratory, New Mexico 87545, USA

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

SANDVIK Coromant

SECO

SANDVIK AT ILL (NEUTRONS)

ILL - INSTITUT LAUE LANGEVIN, GRENOBLE

Neutron and **X-ray diffraction study** of (**Cr**, **Co**) **7C3**

B Kaplan, JM Joubert, M Selleby, S Norgren... - 2015 - diva-portal.org

In view of the extensive use of Cr as a grain growth inhibitor in WC-Co cemented carbides this thesis comprises a combined experimental and ab initio study of a number of critical issues pertaining to phase equilibria of the subsystems to the W-Co-Cr-C system.

COMMONALITIES IN EXPERIMENTAL SETUPS

In situ

Few samples

Mechanical loads

Publications

High temperature

Diffraction

DRIVING FORCES FOR SANDVIK

FUNDAMENTAL RESEARCH

- Often done in collaboration with universities
- Application inspired
- Good fit for large-facility use

APPLIED RESEARCH

- Long history in materials science
- Some collaboration with universities
- Application directed

DEVELOPMENT

- Testing driven
- Needs input from research to be effective

A COMMON THREAD

Sandvik R&D ⟷ Research group at University ⟷ Synchrotron/neutron facility

Difficult problem (funding)

Expertise in field & measurement tech.

Good access & support


THANK YOU FOR LISTENING!
SANDVIK