

# Shock-wave methods for studying the properties of materials and the development of modern machine tool construction

Novikov S V<sup>1</sup>, Rostilov T A<sup>2</sup> and Ziborov V S<sup>2,®</sup>

<sup>1</sup> Stankoinstrument Journal, Joint Stock Company “Technosphera”,  
Krasnoproletarskaya 16 Bldg 2, Moscow 127473, Russia

<sup>2</sup> Joint Institute for High Temperatures of the Russian Academy of Sciences,  
Izhorskaya 13 Bldg 2, Moscow 125412, Russia

® ziborov.vs@yandex.ru

Some features of physical processes that affect the properties of the cutting tool and the material being processed during high-speed processing are considered. It is shown that the use of the laser interferometry method for measuring the velocity profiles of the free surface of samples under one-dimensional shock compression is an informative tool for obtaining the data necessary for choosing optimal ultra-high-speed cutting modes. Using the example of a numerical model for calculating the mechanical behavior of materials during high-speed orthogonal cutting, taking into account fracture, temperature effects and thermal conductivity. It is shown that acceptable accuracy can be achieved only with knowledge of impact adiabats, the value of dynamic viscosity and, apparently, the break-away strength, as a value depending on defects in the structure of materials.