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Effect of carbon presence in CrCN coatings on machining of aluminium alloysLadislav Cvrček¹, Stanislav Krum², Pavel Sachr²¹Czech Technical University in Prague, Praha 2, Czech Republic ²Czech Technical University in Prague, Prague 2, Czech Republic

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Precise and high quality machining of the surface is required for aluminium alloys used in the aerospace industry. The resulting surface treatment must not cause stress or defects that could cause the formation or spread of cracks in the surface. For this reason, two basic conditions have to be met: a) selection of a correct tool geometry allowing a smooth chip removal reducing local overheating of the tool and b) selection of a convenient chemical composition of the tool surface to prevent sticking of the machined material to the tool.

The effort to reduce costs and the ecological impact leads to the elimination of the use of cutting fluids and therefore high-speed dry machining is increasingly preferred. In this case, the tool surface must prevent possible chemical reactions or diffusion between the coating and the machined aluminium alloy at temperature peaks up to 650°C at the cutting edge of the tool. For the dry machining of aluminum alloys, ZrN and CrCN coatings are often used. In contrast, coatings containing only Cr and Al may be problematic because they can increase friction leading to welding with the machined material at elevated temperatures due to diffusion and the ability to create a mixed interface.

The aim of the work was to explain the influence of carbon in CrCN coating and to compare its behaviour with CrN coating and surface without any coating in direct contact with machined aluminium alloy under limit conditions, for example without cooling or at the maximum speed recommended for the given cutting tool.

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