

CASE STUDY

WOOD CUTTING MADE EASIER

Problem – Challenge

Empa scientists joined forces with OERTLI Werkzeuge AG and developed ceramic materials for super-sharp wood cutting blades. Conventional machines work with blades made of tungsten carbide. The project goal was to develop an innovative product at a marketable price because the cutter that was developed initially was up to five times more efficient than conventional blades, but simply too expensive for mass production. The now developed ceramic blades cut just as well as those made of carbide metal, but are a lot lighter and thus faster. Instead of 75 to 95 meters per second, the ceramic blades are able to cut through wood at a speed of 120 to 150 meters per second. Moreover, they also more than match up to carbide metal cutters in price.

Solution

The difficulty was that there was a major drawback for wood processing: ceramic materials are not very good at dissipating heat. Without cooling, the blade would overheat, which would, in turn, leave unattractive burn marks on the wood. This is hardly surprising as temperatures of up to 800 degrees Celsius build up during the cutting process. Nevertheless, the Empa team found a solution: an ultrathin coating that reduces friction and at the same time dissipates heat more effectively. OERTLI Werkzeuge AG launched the first practical cutting tests and examined the durability of various blades. As the price of tungsten used in previous blades have ballooned in recent years, the timing for the new ceramic blade could not be better.

