**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 has ballooned in recent years, the timing for the new ceramic blade could not be better.

**CASE STUDY**

**RECOS, a customized cognitive remediation training programme to improve cognitive performance in patients with mental illness**

**Problem – Challenge**
Individuals suffering from mental illness including schizophrenia, bipolar disorder or depressive disorder often experience cognitive deficits. These deficits may lead to severe disability in everyday life and have a negative impact on patient’s adaptive and social competences. Moreover poor cognitive functioning in people with severe mental illness appears to contribute to lower levels of work. Conventional treatments have limited effects on cognitive deficits. Therefore, improving cognitive abilities is essential for social and vocational recovery. A recent review of the relationship between cognitive deficits and functional outcomes has emphasized the importance of developing new treatment for these deficits.

**Solution**
Based on the principles of cognitive psychology, neuropsychology, psychopedagogy and cognitive behavioural therapy, RECOS – C0gnitive REMediation for Schizophrenia – was developed by the Departement of Psychiatry of the Centre Hospitalier Universitaire Vaudois in Lausanne. RECOS is an individualized cognitive rehabilitation treatment to take into account the cognitive heterogeneity characterizing this disorder. Before beginning cognitive training, functional consequences of cognitive troubles are evaluated with each patient using qualitative criteria. Interventions are aimed at concrete goals defined according to the patients’ difficulties and discussed regularly throughout the therapy. RECOS exercises were designed to be engaging and similar to real life situations in order to facilitate generalization to everyday life skills and to enhance motivation. It includes both computer based and paper and pencil exercises. Recent studies show that RECOS therapy is effective in improving cognitive functioning and functional outcomes.