

Processing chrome-cobalt alloys with HiPIMS



Manufacturing implants in medical technology

Endoprosthetics is a growth area. Increasing life expectancy, extreme sports with greater risk of injury or deterioration due to obesity are the reasons for the increasing number of joint implants. During their manufacture from complex chrome-cobalt alloys, HiPIMS-coated tools provide the surface quality that is essential to medical applications.

Our knee- and hip-joints render top performance every day. Thanks to modern materials, medical technology can maintain the functionality of our musculoskeletal system into advanced age or reestablish it after an injury with an artificial replacement. Chrome-cobalt alloys are among the most useful materials for modern endoprosthetics. They easily support permanent high peak loads in artificial knee- and hip-joints. Thanks to their biocompatibility, they fuse easily with body tissue and they also show no signs of corrosion after many years.

„CHROME-COBALT ALLOYS for endoprosthetics place EXTREME DEMANDS on cutting tools. Adapted InoxaCon®-coating specifications produce HIGH-QUALITY SURFACES.“

“The alloys used are both hard and very tough, and have reduced thermal conductivity, which results in high cutting edge temperatures during machining”, says Inka Harrand, Product Manager for indexable inserts at CemeCon, as she describes the processing challenges. Pressure and heat can lead to strain hardening at the surface of the implant. The expensive blank turns into rubbish. “That’s why good cooling is important. It is more effective to reduce the heat generation as much as possible.” Here, InoxaCon® has two advantages: The smooth coating surface decreases

friction. Thanks to the superior film properties, only 1.5 µm or 3 µm coating thicknesses are required. Hence, the cutting edges remain so sharp that feed and cutting speed can be chosen uncompromisingly for minimal cutting forces, i.e. small pressure. In this way, InoxaCon® reliably prevents work hardening and guarantees process stability.

Wear protection and temperature stability thanks to intelligent coating specifications

The quality of the milled surfaces is decisive for the healing process and a firm seat of the implant in the bone. Conventionally, the required degree of surface roughness is obtained through multistage polishing. Intelligently adapted tools with InoxaCon® coating specifications produce such a perfect result while milling that there is no need for extensive polishing. Shorter process times mean more efficient automated manufacturing. The superior surface of the machined implant opens the door to the medical sector for cutting tool producers.

„In medical technology are DEMANDS ON QUALITY AND PRECISION very high. CEMECON-TECHNOLOGY – leading in diamond, sputter and HiPIMS coatings – can apply SUCCESSFULLY TO THE APPLICATIONS.“

Their corrosion protection and resistance to acids also predestine the chrome-cobalt alloys for use in the mouth cavity. “Their coefficient of thermal expansion also makes them suitable for tooth replacements of chrome-cobalt alloys, it corresponds to that of ceramics”, describes Harrand. “No cracks arise between the materials during heat treatment.” HiPIMS coatings are applied to very delicate tools for the manufacture of crowns, bridges, or inlays. Particular pretreatments of carbide make maximal adhesion possible even here without changing its microgeometry.

“Demands on quality and precision are very high in medical technology. But so they are in other security-related areas”, explains Harrand. “That’s why we can apply our experience from over 30 years of tool coatings. A successful example of how we apply CemeCon technology – leading in diamond, sputter and HiPIMS coatings – to more and more applications and areas.”

Medical technology | Dentistry | Implants | Chrome-cobalt alloys | Thermal conductivity | Cutting inserts | Coating thickness | Process reliability | Micro tools | Micro-geometry | HiPIMS | PVD | InoxaCon®