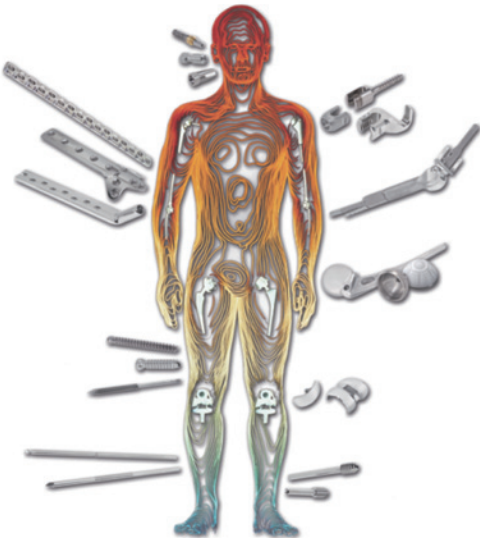


# CUTTING TOOLS: CHALLENGES IN MACHINING

Component manufacturers face challenging situations in machining. Their customers are asking smaller, more complex parts produced with improved accuracies from difficult to machine materials, from gummy stainless steels, titanium alloys, cobalt chrome and hardened special steels. On top of this, biocompatibility, corrosion resistance and high strength will prevail over machinability. All this under the close scrutiny of regulatory agencies that require extensive process control changes and costly compliance documentation.



Orthopedic devices are designed to conform to the complex shape of bones and joints, so the machining of these parts is also complex. Devices machined from bar stock require a lot of material to be removed, resulting in an expensive process because of the low machinability rating of many of the materials involved. As a result, some parts are cast or forged to near net shape. Another issue that adds to the complexity of machining is the tight tolerances required at 0.05 mm or less-for most devices.



These pressures have given rise to new technologies in machines and cutting tools to help cope and compete. Multiple-axis turning machines tools, new insert grades and innovative thread-whirling machines are capable of producing complex parts to extreme tolerances resulting in the production of high-quality parts at faster rates by eliminating the problems that were inherent in earlier technology.

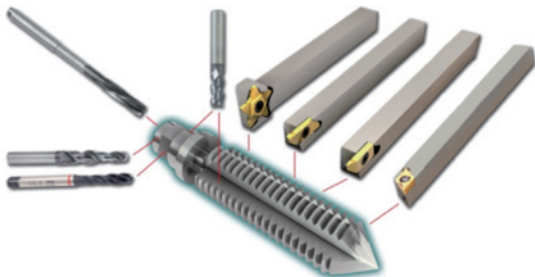
## Materials

Stainless steels and titanium are the materials most used for medical implants. Titanium alloys typically are preferred for medical implants because of its light weight, high strength and biocompatibility. Also, titanium implants are compatible with magnetic resonance imaging and computed tomography imaging procedures, so they do not interfere with those procedures if the patient needs them after the implant is made.

## Cutting tools

In thread whirling, milling, turning, internal tapping, grooving, drilling or reaming, most cutting tools underwent significant advances such as:

- improved substrates with fine grain or submicron grades carbides or powder metallurgy high speed steels,
- geometries with aggressive chipbreakers and through coolant to improve chip control and evacuation,
- clamping systems to eliminate micro-vibrations,
- advanced coatings such as TiAN or TiCN to reduce friction to avoid machining heat and microscopic stress raisers.



## Partner

*ISCAR is a producer of unique and innovative cutting tools for metalworking, including turning, grooving, milling, hole making, boring and threading tools.*

*The company was founded in 1952 by Stef Wertheimer with company headquarters in Tefen, in Israel's Western Galilee.*

*The company has expanded from a single marketing and manufacturing facility in Israel to a multinational company with representation in over 50 countries and plants for special tools and inserts in the Americas, Central and Eastern Europe, Asia, Turkey and Israel.*

[www.iscar.com](http://www.iscar.com)

