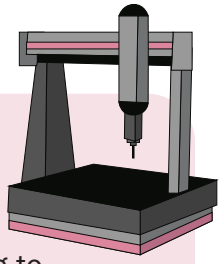
TOOLS OF THE TRADE

# CNC MILL

**CONCEPT** CNC mills are computer-controlled machines used for cutting and shaping various materials, such as metal, wood, and plastics. They use rotary cutting tools to remove material from a workpiece, which is clamped to a table that moves along different axes (X, Y, and Z) to achieve the desired shape and size.

## BACKGROUND

The history of CNC mills dates back to the 1940s, when the U.S. Air Force commissioned the Massachusetts Institute of Technology (MIT) to develop a way to automate the manufacture of complex airplane parts. This led to the development of the first numerical control machines, which used punched paper tape to control the machine's movements. In the 1960s, the first computer-controlled milling machines were developed, which used digital computers to control the cutting process. By the 1980s, the use of CNC mills had become widespread in the manufacturing industry, allowing for faster, more accurate, and more complex machining operations. Today, CNC mills are used in a wide range of applications, from prototyping to mass production, and continue to evolve with advancements in automation, software, and materials.



## APPLICATION

Medical implants, such as hip and knee replacements, require precise and intricate machining to ensure a perfect fit and optimal performance in the human body. CNC mills are used extensively for this purpose, as they allow for highly accurate and consistent machining of complex geometries. The use of CAD/CAM software in conjunction with CNC mills allows for the creation of 3D models of the implants.

Different materials can be used with CNC mills such as titanium and cobalt-chrome alloy components. In the dental industry, some dental providers have milling machines that can custom fabricate dental crowns within the same visit of the patient. Once the tooth has been prepped by the dentist, a digital impression is captured using a scanner. That digital image is then sent to the milling machine which takes a specifically shaded porcelain block that matches the shade of the patient's tooth prior to start of the procedure. Within a little over an hour after the milling process begins, a patient can be leaving the dentist with their permanent crown!