INNOVATIVE TOOLING SOLUTIONS
Seco works closely with medical manufacturers to create and provide solutions that increase productivity and bolster profitability. With 5,000 team members in over 45 countries, we offer a globally networked resource dedicated to solving your challenges and supporting your operations. Through cooperative partnerships with medical manufacturers and entities around the world, we monitor trends, identify challenges and develop solutions that overcome the industry’s most demanding applications.

When you work with Seco, you experience a true partnership based on trust, respect and communication. Our solutions exceed milling, holemaking, turning and tool holding products, as we work closely with your team to address and improve every aspect of production. For over 80 years, Seco has developed the tools, processes and services that leading manufacturers turn to for maximum performance. Our team is always ready to help you overcome whatever challenges you encounter through extensive expertise and high quality products.

Seco customers can also access the latest information regarding new products, machining data, manufacturing techniques and other developments by visiting our website at www.secotools.com.
The medical industry has experienced substantial growth in recent years, a trend expected to continue due to a variety of factors. Increasing life spans across the world have led to a greater demand for implants, while health issues such as obesity, arthritis, disease and trauma have put more strain on many individuals’ health.

The worldwide economic issues of the past several years have created a growing demand to reduce costs, leading to substantial research and development into new materials and processes. Additionally, higher levels of regulation have created a need for more predictable and stable manufacturing methods. As these trends continue, medical manufacturers will face the ongoing challenge of adapting to an evolving market.

Seco has worked closely with global medical manufacturers for decades, building a foundation of expertise that makes us a valuable partner to those serving the industry. We also partner with research institutes, universities and other industry entities to fully understand the challenges medical manufacturers face and develop the solutions to overcome them. Our own R&D focuses on the advanced technologies, tools, strategies and component solutions that will drive and evolve your processes.

As the medical industry continues to innovate and grow, Seco is here to help you understand and overcome the metal cutting challenges you encounter.
HIP REPLACEMENT COMPONENTS
ACETABULAR CUP
Requiring extreme precision, acetabular cups are composed of a titanium or cobalt chrome shell and Ultra High Molecular Weight Polyethylene liner. The shape of these components requires the use of custom fixturing during machining; their thin walls increase the importance of eliminating vibration from the process. Custom tools are often required to effectively and competitively create these complex components.

FEMORAL CAP
Attached to the top of the femoral stem, a femoral cap must be machined to size and then polished to reduce the wear of the socket liner, ensuring maximum life of the implant. Often machined from cobalt chrome bar stock, the component demands high tolerances and surface quality. CBN inserts can provide a substantial advantage in meeting these challenges.

STEM
Produced from titanium due to the material’s modulus of elasticity being similar to that of bone, hip stems can be designed as modular or monolithic components. Extreme taper tolerances must be held to ensure that components mate optimally when implanted. Some versions also incorporate threaded holes for positioning and extraction, requiring a highly accurate thread milling process.
FEMORAL PART
Usually machined from cobalt chrome, this round ended implant mimics the natural shape and form of the joint. Traditionally produced on 5-axis grinding machines due to the required levels of precision and surface finish, breakthroughs in tool design have enabled the milling of these components. Correct application of small-diameter end mills with specific radii and tapered ball nose cutters can provide substantial productivity increases.

BEARING INSERT
Produced from Ultra High Molecular Weight Polyethylene, the bearing insert features a complex shape and absorbs weight to avoid metal-on-metal stress in an artificial knee. The component requires absolute precision, even as the stringy properties of the material used make machining more difficult. Dedicated finishing tools with extremely sharp cutting edges can enable the necessary levels of quality.

TIBIAL TRAY
Implanted at the top of the tibia, the tibial tray can be machined from titanium, though cobalt chrome is more often used due to material cost. These parts are often machined from near-net-shape forgings, requiring custom fixtures for machining and specialized tools, grades and geometries for achieving the required accuracy and productivity.
SPINAL & TRAUMA COMPONENTS

PLATE
Used throughout the human body, plates that stabilize broken bones during the healing process are manufactured in thousands of shapes and sizes. Typically referred to as internal fixators or trauma plates, these components can vary greatly, with highly specialized versions designed and produced for applications such as spinal stabilization and fusion. Commonly produced from titanium or cobalt chrome, these implants present unique manufacturing challenges.

BONE SCREW
Bone screws are used to secure a variety of orthopedic implants, primarily for repairing fractured bone with plates, and also for surgeries to stabilize or correct the spine. Machined from titanium or stainless steel (depending on the application) these components require that the material used, size of features and tolerance requirements must be taken into account during the machining process.

HEAD
Used in surgeries intended to correct or stabilize the spine for various reasons, heads are secured to the vertebra with bone screws. These then secure the rods that connect vertebra together. Typically produced on Swiss style turning centers, heads are also made from implantable titanium and cobalt chrome. Achieving high productivity in small diameter turning, milling, and drilling is the primary challenge faced by manufacturers.
DENTAL IMPLANT COMPONENTS

ABUTMENT
Produced from titanium or zirconia, the abutment serves as an interface between the prosthetic teeth and the implants placed in a patient’s mouth. These small components may require angles, tapers and screw threads.

CROWN
Used to replace an individual tooth, single crowns are typically machined from zirconia, titanium or a cobalt chrome alloy. Because crowns must fit a specific patient’s mouth, they tend to be custom parts.

BRIDGE & BAR
Mounted across several implants to serve as an interface for prosthetic teeth, bars and bridges can feature a variety of interfaces, including tapered fit or screwed. Custom made to conform to the physiology of an individual’s mouth, these components are made from zirconia, titanium or a cobalt chrome alloy.
HIP REPLACEMENT COMPONENTS:
ACETABULAR CUP

TURN HARD, ABRASIVE COMPONENTS
Seco Turning Grade TS2050

YOUR CHALLENGE:
• Increase tool life

YOUR SOLUTION:
TS2050 is a TiSiN-TiAlN coated grade that features a coating structure with a Nanolaminate PVD top layer for maximum toughness and high chipping resistance. It is highly applicable in both CoCr and titanium alloys.

YOUR BENEFITS:
• Highly resistant to edge fracture
• Long, predictable tool life
• Maximazed part quality

IDEAL FOR:
• Acetabular cups

STABLE MACHINING
Custom Toolholder

YOUR CHALLENGE:
• Reduce vibration

YOUR SOLUTION:
A custom toolholder combined with inserts featuring sharp cutting edges and excellent chip control reduces cutting forces and provides a soft cutting action for a reduction in vibration.

YOUR BENEFITS:
• More stable process
• Superior surface finish

IDEAL FOR:
• Acetabular cups
**TURN SPHERICAL CUPS**
Round Turning Inserts

**YOUR CHALLENGE:**
- Optimize turning of acetabular cups

**YOUR SOLUTION:**
Round turning inserts strike an excellent balance of process security and productivity during internal turning. The inserts can reduce cycle times by 50% and tooling costs by 33%.

**YOUR BENEFITS:**
- Higher output
- Improved profitability

**IDEAL FOR:**
- Acetabular cups
- Femoral caps

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**TURN HIP REPLACEMENT COMPONENTS**
Jetstream Tooling® Duo

**YOUR CHALLENGES:**
- Control chip flow
- Maximize turning productivity

**YOUR SOLUTION:**
Jetstream Tooling Duo applies one or more additional coolant jets from a second direction to quickly and effectively remove heat from the cutting zone and flush the clearance surface to enable the use of higher cutting speeds.

**YOUR BENEFITS:**
- Longer tool life
- Higher productivity
- Better chip control
- Excellent part quality

**IDEAL FOR:**
- Acetabular cups
- Stems
HIP REPLACEMENT COMPONENTS: FEMORAL CAP

TURNING AND GROOVING OPERATIONS
MDT Jetstream Tooling

YOUR CHALLENGES:
• Ensure stability
• Improve chip evacuation

YOUR SOLUTION:
MDT Jetstream Tooling delivers a high-pressure jet of coolant through the top clamp. The MDT system’s serrated contact surfaces between the insert and toolholder provide the cutting process with very good stability.

YOUR BENEFITS:
• Increased process reliability
• Enhanced productivity
• Improved safety
• High performance

IDEAL FOR:
• Femoral caps

FINISH MACHINING
Secomax™ CBN200 Grade Inserts

YOUR CHALLENGE:
• Boost productivity

YOUR SOLUTION:
CBN200 grade incorporates a unique metal binder with fine grain size to provide exceptional toughness and wear resistance in hard turning and hard milling. Available in tipped, multi-tipped, full-faced and solid formats.

YOUR BENEFITS:
• Robust performance
• High process security
• Shorter cycle times

IDEAL FOR:
• Femoral caps
TURN SPHERICAL CUPS
Round Turning Inserts

YOUR CHALLENGE:
• Optimize turning of femoral caps

YOUR SOLUTION:
Round turning inserts strike an excellent balance of process security and productivity during internal turning. The inserts can reduce cycle times by 50% and tooling costs by 33%.

YOUR BENEFITS:
• Higher output
• Improved profitability

IDEAL FOR:
• Acetabular cups
• Femoral caps

PARTING OPERATIONS
MDT System

YOUR CHALLENGE:
• Attain reliable tool performance

YOUR SOLUTION:
The MDT (Multi-Directional Turning) system includes holders and inserts that feature our unique Secoloc insert clamping solution consisting of a top clamp with serrated contact surfaces between the insert and toolholder to optimize performance.

YOUR BENEFITS:
• Tremendous stability
• Reliable results
• Increased productivity
• Stable process
• High repeatability

IDEAL FOR:
• Femoral caps
HIP REPLACEMENT COMPONENTS: STEM

FINISHING OPERATIONS
VCGT Inserts

YOUR CHALLENGE:
• Achieve high quality surface finish

YOUR SOLUTION:
Using insert VCGT160404F-AL KX grade for finishing operations allows for consistent surface quality in the end component.

YOUR BENEFIT:
• Superior quality

IDEAL FOR:
• Stems

TURNING HIP REPLACEMENT COMPONENTS
Jetstream Tooling

YOUR CHALLENGE:
• Maintain tight tolerances within the neck dimension

YOUR SOLUTION:
Jetstream Tooling delivers a jet of high pressure coolant to the optimum position of the cutting edge to rapidly cool chips and make them brittle and easier to control. The system also lifts chips from the rake face, to stabilize the machining process and allow the use of more aggressive cutting data.

YOUR BENEFITS:
• Increased tool life
• Higher productivity
• Better chip control
• Improved accuracy

IDEAL FOR:
• Stems
HOLE DRILLING AND CHAMFERING
Seco Feedmax™ Custom Drill & Chamfer

YOUR CHALLENGE:
• Maintain tight tolerances in holes

YOUR SOLUTION:
A custom drill and chamfer tool specific to a component’s required tolerance provides a unique solution that combines two processes into one and achieves perfect results on every part.

YOUR BENEFITS:
• Less scrap
• Decreased costs
• Higher profitability
• Higher productivity
• Superb quality

IDEAL FOR:
• Stems

HOLE THREADING
Threadmaster™

YOUR CHALLENGES:
• Maintain size tolerances
• Improve surface quality

YOUR SOLUTION:
The Threadmaster family of solid thread milling cutters performs high-precision threading of components. When applied with Seco’s Threading Wizard software, manufacturers can adapt the method of threading holes to increase quality and reduce cycle times.

YOUR BENEFITS:
• Increased precision
• Less scrap
• Reduced cycle times

IDEAL FOR:
• Stems
KNEE REPLACEMENT COMPONENTS: FEMORAL PART

FINISH BOX WALLS
Jabro™ Custom End Mill

YOUR CHALLENGES:
• Achieve superior box wall finish
• Minimize manual polishing

YOUR SOLUTION:
This Jabro custom solid carbide tapered ball nose end mill is specifically designed with a unique geometry and coating to achieve excellent part finish and tool life in cobalt chrome. A variety of ball radii and taper angles are available.

YOUR BENEFITS:
• Higher quality
• Reduced need for manual polishing
• Increased productivity
• Improved ergonomics

IDEAL FOR:
• Femoral parts

ROUGHING COBALT CHROME
Jabro HPM

YOUR CHALLENGE:
• Maximize machining productivity

YOUR SOLUTION:
The optimized geometry and design of the Jabro JHP900 series with roughing profile achieves high metal removal rates and provides a smooth cutting action when machining cobalt chrome.

YOUR BENEFITS:
• Reduced costs
• Increased tool life
• Increased throughput

IDEAL FOR:
• Femoral parts
• Tibial trays
FINISH OUTSIDE PROFILES
Jabro JHP770

YOUR CHALLENGE:
• Produce a burr-free outside profile

YOUR SOLUTION:
The Jabro JHP770 incorporates differential flute spacing to minimize vibration, a polished Siron-A coating to boost tool life, and optimized edge preparation and internal coolant channels to increase performance when finish machining challenging materials.

YOUR BENEFITS:
• Improved efficiency
• High quality component outer profile

IDEAL FOR:
• Femoral parts

FINISH OUTSIDE PROFILES
Jabro TDM Range

YOUR CHALLENGE:
• Guarantee reliable tool performance

YOUR SOLUTION:
The Jabro TDM family of solid carbide ball nose cutters features tapered shanks to improve rigidity and increase the tool’s reach.

YOUR BENEFITS:
• Impeccable quality
• Predictable tool life

IDEAL FOR:
• Femoral parts
**FINISH CONDYLE SURFACES**
Jabro Premier Finish Tool

**YOUR CHALLENGE:**
• Maintain superior finishes

**YOUR SOLUTION:**
The Jabro Premier Finish solid carbide tool features a design based on a concave or convex section either tangential or connected with a straight line for profile tolerances that are extremely small compared to standard tools.

**YOUR BENEFITS:**
• Eliminate operational grinding behaviors
• Smooth, polished finish

**IDEAL FOR:**
• Bearing inserts

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**MACHINE ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE**
Jabro Solid Carbide Cutter

**YOUR CHALLENGE:**
• Avoid burrs

**YOUR SOLUTION:**
The Jabro Solid Carbide Cutter features a helix geometry and sharp cutting edge designed specifically for the challenges of machining Ultra High Molecular Weight Polyethylene.

**YOUR BENEFITS:**
• Increased confidence
• High quality
• Maximum productivity

**IDEAL FOR:**
• Bearing inserts

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**KNEE REPLACEMENT COMPONENTS:**
**BEARING INSERT**
MACHINE STABILIZING PEGS
Jabro Custom Tooling

YOUR CHALLENGE:
• Reduce cycle times

YOUR SOLUTION:
This custom Jabro solid carbide end mill is designed specifically to save time and achieve superior surface quality in the machining of the peg form and radii.

YOUR BENEFITS:
• Minimized cycle times compared to traditional copy milling strategies
• Increased component quality

IDEAL FOR:
• Bearing inserts

ROUGHING COMPLEX CONTOURS
Seco Aeromaster

YOUR CHALLENGE:
• Maximize material removal rates

YOUR SOLUTION:
The Seco Aeromaster line combines a positive axial rake with high rake polished inserts to provide highly effective material removal when machining complex contours.

YOUR BENEFIT:
• Time savings

IDEAL FOR:
• Bearing inserts
MILLING BASE OF TIBIAL TRAY
Jabro Custom Tooling

YOUR CHALLENGES:
• Attain superior surface finishes
• Minimize manual intervention

YOUR SOLUTION:
This custom Jabro solid carbide end mill incorporates wiper technology on the cutter base to allow an almost polished effect to be achieved on the base of the tibial tray.

YOUR BENEFITS:
• Optimal surface quality
• Reduced need for manual polishing operations
• Faster throughput

IDEAL FOR:
• Tibial trays

ROUGHING COBALT CHROME
Jabro HPM

YOUR CHALLENGE:
• Maximize machining productivity

YOUR SOLUTION:
The optimized geometry and design of the Jabro JHP900 series with roughing profile achieves high metal removal rates and provides a smooth cutting action when machining cobalt chrome.

YOUR BENEFITS:
• Reduced costs
• Longer tool life
• Increased throughput

IDEAL FOR:
• Tibial trays
• Femoral parts

KNEE REPLACEMENT COMPONENTS: TIBIAL TRAY
MACHINING INSIDE TRAY WALL
Jabro Custom Tooling

YOUR CHALLENGE:
• Create the best combination of productivity, cost and quality

YOUR SOLUTION:
By simultaneously generating the chamfer break edge while providing the necessary surface finish for the inside of the tray wall, this custom Jabro solid carbide end mill strikes an excellent balance of productivity and quality.

YOUR BENEFITS:
• Reduced cycle times
• Reliable quality
• Reduced component costs

IDEAL FOR:
• Tibial trays

MACHINING LOCKING DETAILS
Jabro Custom Tooling

YOUR CHALLENGE:
• Eliminate burrs

YOUR SOLUTION:
This custom Jabro solid carbide T-slot tool excels in producing the undercuts needed for tibial tray locking details.

YOUR BENEFITS:
• Eliminated burrs
• Extremely high surface quality
• Features machined to exacting quality standards

IDEAL FOR:
• Tibial trays

MACHINE COBALT CHROME
Jabro Custom Tooling

YOUR CHALLENGE:
• Obtain more reliable tool performance

YOUR SOLUTION:
This custom Jabro solid carbide cutter features a geometry created to effectively machine cobalt chrome and a reduced flute length to minimize tool projection.

YOUR BENEFITS:
• Increased stability
• Very reliable tool life
• Greater confidence in cutting process

IDEAL FOR:
• Tibial trays
SPINAL & TRAUMA COMPONENTS: PLATE

MEDICAL IMPLANT DRILLING
Seco Feedmax Solid Carbide Drills

YOUR CHALLENGES:
• Increase process security
• Optimize hole quality

YOUR SOLUTION:
These solid carbide drills feature light cutting geometries and sharp, positive and strong cutting edges, allowing them to excel in heat resistant superalloys and other challenging materials.

YOUR BENEFITS:
• Long, predictable tool life
• Minimized residual stress
• Consistent hole quality
• Reduced exit burrs
• Less deformation hardening
• High process security

IDEAL FOR:
• Spinal & bone plates
• Head & bone screws
• Dental plates
• Dental bridges

ROUGHING COMPLEX SURFACES
R220.21 High Feed Milling Cutter

YOUR CHALLENGES:
• Increase process security
• Optimize productivity

YOUR SOLUTION:
The R220.21 High Feed Milling cutter incorporates small setting angles to direct cutting forces axially, reducing vibration for more stable machining.

YOUR BENEFITS:
• Long, predictable tool life
• Reduced costs
• Higher productivity
• Improved throughput
• Improved profitability
• Increased process confidence

IDEAL FOR:
• Spinal & bone plates
MACHINING SPINAL AND BONE COMPONENTS
Jabro Custom Tooling

YOUR CHALLENGES:
• Achieve maximum performance
• Improve process stability

YOUR SOLUTION:
Our engineers work closely with your team using a tested and proven approach to create custom Jabro solid carbide end mills to address unique and demanding process needs that require performance beyond standard tooling.

YOUR BENEFITS:
• Tailor-made solution for specific application
• Increased process confidence

IDEAL FOR:
• Spinal & bone plates

ROUGHING COMPLEX SURFACES
High Feed Milling Cutters

YOUR CHALLENGES:
• Optimize productivity
• Improve process stability

YOUR SOLUTION:
Seco high feed milling cutters incorporate small setting angles to direct cutting forces axially, reducing vibration for more stable machining.

YOUR BENEFITS:
• Longer tool life
• Reduced costs
• Higher productivity
• Improved throughput
• Improved profitability

IDEAL FOR:
• Spinal & bone plates
**SPINAL & TRAUMA COMPONENTS: HEAD & BONE SCREW**

**MACHINE SMALL COMPONENTS**
Jabro Mini

**YOUR CHALLENGES:**
- Maximize productivity
- Improve part quality

**YOUR SOLUTION:**
With diameters as small as 0.1 mm, the Jabro Mini family brings together the optimum combination of hard metal quality, milling cutter geometries and coatings technology to effectively machine small components from soft to hardened and abrasive materials.

**YOUR BENEFITS:**
- High quality
- Increased production
- Greater return on investment

**IDEAL FOR:**
- Head & bone screws
- Dental abutments
- Dental crowns
- Dental bridges
- Dental bars

**MEDICAL IMPLANT DRILLING**
Seco Feedmax Solid Carbide Drills

**YOUR CHALLENGES:**
- Increase process security
- Optimize hole quality

**YOUR SOLUTION:**
Seco Feedmax solid carbide drills feature light cutting geometries and sharp, positive and strong cutting edges, allowing them to excel in heat resistant superalloys and other extremely challenging materials.

**YOUR BENEFITS:**
- Long, predictable tool life
- Minimized residual stress
- Consistent hole quality
- Reduced exit burrs
- Less deformation hardening
- High process security

**IDEAL FOR:**
- Spinal & bone plates
- Head & bone screws
- Dental plates
- Dental bridges
TURNING HARD, ABRASIVE COMPONENTS
Seco Turning Grade TS2050

YOUR CHALLENGE:
• Increase tool life

YOUR SOLUTION:
TS2050 is a TiSiN-TiAlN coated grade that features a coating structure with a Nanolaminate PVD top layer for maximum toughness and high chipping resistance. It is highly applicable in both CoCr and titanium alloys.

YOUR BENEFITS:
• Highly resistant to edge fracture
• Long, predictable tool life
• Maximized part quality

IDEAL FOR:
• Head & bone screws

FINISHING OPERATIONS
Jabro-Solid²

YOUR CHALLENGES:
• Maximize productivity
• Optimize process security

YOUR SOLUTION:
Jabro-Solid² endmills represent a wide range of universal products that apply to all commonly machined materials, from steel and cobalt chrome to titanium alloy.

YOUR BENEFITS:
• Superb quality
• Enhanced productivity
• Improved cost efficiency

IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental bridges
• Dental bars
MACHINE SMALL COMPONENTS
Jabro Mini

YOUR CHALLENGES:
• Maximize productivity
• Improve part quality

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With diameters as small as 0.1 mm, the Jabro Mini family brings together the optimum combination of hard metal quality, milling cutter geometries and coatings technology to effectively machine small components from soft to hardened and abrasive materials.

YOUR BENEFITS:
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• Increased production
• Greater return on investment

IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars

ROUGHING COMPLEX SURFACES
Jabro HFM

YOUR CHALLENGES:
• Maximize productivity
• Increase process security

YOUR SOLUTION:
The Jabro HFM cutter incorporates small setting angles to direct cutting forces axially, reducing vibration for more stable machining.

YOUR BENEFITS:
• Long, predictable tool life
• Reduced costs
• Higher productivity
• Improved throughput
• Improved profitability
• Increased process confidence

IDEAL FOR:
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars

DENTAL IMPLANT COMPONENTS: ABUTMENT

FINISHING OPERATIONS
Jabro-Solid²

YOUR CHALLENGES:
• Maximize productivity
• Optimize process security

YOUR SOLUTION:
Jabro-Solid² endmills represent a wide range of universal products that apply to all commonly machined materials, from steel and cobalt chrome to titanium alloy.

YOUR BENEFITS:
• Superb quality
• Enhanced productivity
• Improved cost efficiency

IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental bridges
• Dental bars
DENTAL IMPLANT COMPONENTS: CROWN

ROUGHING COMPLEX SURFACES
Jabro HFM

YOUR CHALLENGES:
• Maximize productivity
• Improve process security

YOUR SOLUTION:
The Jabro HFM cutter incorporates small setting angles to direct cutting forces axially, reducing vibration for more stable machining.

YOUR BENEFITS:
• Long, predictable tool life
• Reduced costs
• Higher productivity
• Improved throughput
• Improved profitability
• Increased process confidence

IDEAL FOR:
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars

MACHINE SMALL COMPONENTS
Jabro Mini

YOUR CHALLENGES:
• Maximize productivity
• Improve part quality

YOUR SOLUTION:
With diameters as small as 0.1 mm, the Jabro Mini family brings together the optimum combination of hard metal quality, milling cutter geometries and coatings technology to effectively machine small components from soft to hardened and abrasive materials.

YOUR BENEFITS:
• High quality
• Increased production
• Greater return on investment

IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars
MACHINE SMALL COMPONENTS
Jabro Mini

YOUR CHALLENGE:
• Maximize productivity
• Improve part quality

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With diameters as small as 0.1 mm, the Jabro Mini family brings together the optimum combination of hard metal quality, milling cutter geometries and coatings technology to effectively machine small components from soft to hardened and abrasive materials.

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IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars

ROUGHING COMPLEX SURFACES
Jabro HFM

YOUR CHALLENGE:
• Maximize productivity
• Improve process security

YOUR SOLUTION:
The Jabro HFM cutter incorporates small setting angles to direct cutting forces axially, reducing vibration for more stable machining.

YOUR BENEFITS:
• Long, predictable tool life
• Reduced costs
• Higher productivity
• Improved throughput
• Improved profitability
• Increased process confidence

IDEAL FOR:
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars

DENTAL IMPLANT COMPONENTS: BRIDGE
FINISHING OPERATIONS
Jabro-Solid®

YOUR CHALLENGES:
• Maximize productivity
• Optimize process security

YOUR SOLUTION:
Jabro-Solid® endmills represent a wide range of universal products that apply to all commonly machined materials, from steel and cobalt chrome to titanium alloy.

YOUR BENEFITS:
• Superb quality
• Enhanced productivity
• Improved cost efficiency

IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental bridges
• Dental bars

MEDICAL IMPLANT DRILLING
Seco Feedmax Solid Carbide Drills

YOUR CHALLENGES:
• Increase process security
• Optimize hole quality

YOUR SOLUTION:
These solid carbide drills feature light cutting geometries and sharp, positive and strong cutting edges, allowing them to excel in heat resistant superalloys and other challenging materials.

YOUR BENEFITS:
• Long, predictable tool life
• Minimized residual stress
• Consistent hole quality
• Reduced exit burrs
• Less deformation hardening
• High process security

IDEAL FOR:
• Spinal & bone plates
• Head & bone screws
• Dental plates
• Dental bridges

MACHINE SMALL COMPONENTS
Jabro Mini Diamond

YOUR CHALLENGES:
• Maximize productivity
• High quality parts

YOUR SOLUTION:
With diameters as small as 0.1 mm, the Jabro Mini family brings together the optimum combination of hard metal quality, milling cutter geometries and coatings technology to effectively machine small components from soft to hardened and abrasive materials.

YOUR BENEFITS:
• High quality
• Increased production
• Greater return on investment

IDEAL FOR:
• Dental bridges
YOUR CHALLENGES:
• Maximize productivity
• Improve part quality

YOUR SOLUTION:
The Jabro HFM cutter incorporates small setting angles to direct cutting forces axially, reducing vibration for more stable machining.

YOUR BENEFITS:
• Long, predictable tool life
• Reduced costs
• Higher productivity
• Improved throughput
• Improved profitability
• Increased process confidence

IDEAL FOR:
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars

YOUR CHALLENGES:
• Maximize productivity
• Improve part quality

YOUR SOLUTION:
With diameters as small as 0.1 mm, the Jabro Mini family brings together the optimum combination of hard metal quality, milling cutter geometries and coatings technology to effectively machine small components from soft to hardened and abrasive materials.

YOUR BENEFITS:
• High quality
• Increased production
• Greater return on investment

IDEAL FOR:
• Head & bone screws
• Dental abutments
• Dental crowns
• Dental bridges
• Dental bars
FINISHING OPERATIONS
Jabro-Solid²

YOUR CHALLENGES:
• Maximize productivity
• Optimize process security

YOUR SOLUTION:
Jabro-Solid² endmills represent a wide range of universal products that apply to all commonly machined materials, from steel and cobalt chrome to titanium alloy.

YOUR BENEFITS:
• Superb quality
• Enhanced productivity
• Improved cost efficiency

IDEAL FOR:
• Head & bone screws
• Dental abutments
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• Dental bars

MEDICAL IMPLANT DRILLING
Seco Feedmax Solid Carbide Drills

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These solid carbide drills feature light cutting geometries and sharp, positive and strong cutting edges, allowing them to excel in heat resistant superalloys and other challenging materials.

YOUR BENEFITS:
• Long, predictable tool life
• Minimized residual stress
• Consistent hole quality
• Reduced exit burrs
• Less deformation hardening
• High process security

IDEAL FOR:
• Spinal & bone plates
• Head & bone screws
• Dental plates
• Dental bridges
Seco has partnered with Fusion Coolant Systems, the developer of a revolutionary patented coolant system that harnesses supercritical carbon dioxide (scCO\textsubscript{2}) to achieve unprecedented results. Available via the Pure-Cut and Pure-Cut Plus product lines, this entirely new approach to coolant will transform machining across a broad range of industry segments, including medical implants and instruments.
**THE TECHNOLOGY**

When carbon dioxide is pressurized above 74 bar (1,070 psi) and 31°C, it becomes a supercritical fluid. In this state, it fills a container like a gas, but with a density similar to a liquid. When delivered to the cutting zone, scCO₂ expands to form dry ice, though it does not create a cryogenic substance like liquid nitrogen. The end result is an incredibly effective coolant solution that often outperforms existing systems that incorporate high pressure water/oil, minimum quantity lubrication (MQL), liquid CO₂ and liquid nitrogen.

Ideal for biomedical applications, the Pure-Cut product line is completely oil-free. As a result, parts leave the machining process cleaner than when they enter it.

Pure-Cut Plus adds a minimal amount of oil to the process, as little as one drop per ten minutes of operation. The oil dissolves completely within scCO₂, allowing delivery of a layer of cold oil less than one micron in thickness. This provides an incredibly effective friction reduction to the machining process.

**YOUR IMMEDIATE BENEFITS**

**Improved part quality** – scCO₂ provides the perfect amount of heat removal and avoids altering part dimensions. Systems based on air, water or oil are too warm, while liquid CO₂ and liquid nitrogen are too cold.

**Faster machining** – scCO₂ can allow for 100% increases to metal removal rates, while Pure-Cut Plus can lead to increases of 400% or more.

**Longer tool life** – In addition to dramatically boosting productivity, scCO₂ simultaneously increases tool life when compared to systems based on water or oil.

**Elimination of hazards to workers and the environment** – Competing coolant systems create emissions that negatively impact the environment and result in fumes, bacteria and fungus that pose a health risk to operators. scCO₂ removes these harmful effects from the equation. And scCO₂ has a low carbon footprint since the CO₂ used is a recovered waste product of other applications.
TURNING APPLICATIONS
Combining Pure-Cut technology with Seco Jetstream Tooling allows cutting speeds to be doubled when turning titanium, with no increased insert wear or addition of oil. Jetstream Tooling Duo incorporates dual fluid outlets to deliver coolant to optimal points on both the rake and flank side of the tool. When combined with Pure-Cut, it provides an exceptional solution for both rough and finish machining.

For biomedical instruments made from stainless steel, Pure-Cut Plus can be applied. With just 30 drops of oil per hour, material removal rates can be increased by 200–400% with no reduction in tool life compared to traditional coolant.

Seco offers optimized tools that cover a variety of applications including internal and external turning, profiling, grooving and parting-off.

MEDICAL MANUFACTURING
REINVENT YOUR METAL CUTTING PROCESSES

To ensure acceptance by the human body, any biomedical implants must be completely devoid of cutting oil. Removing metalworking fluid from an implant presents a challenge in many applications and is impossible with porous implants that have been produced with additive manufacturing. Conversely, removing cutting oil from the metal cutting process has yielded its own set of challenges in the areas of excessive tool wear, poor surface finish and slow cutting speeds. The innovation of Fusion Coolant offers an alternative that sidesteps these issues entirely.
DRILLING APPLICATIONS
Traditional oil and water emulsions have proven to be a poor solution for increasing the performance of drilling applications. High pressure systems are costly and a challenge to maintain, while capillary pressure resistance in the coolant channels limits effectiveness. Pure-Cut Plus offers dramatic improvements to drilling speeds and material removal rates, while also improving hole quality.

Seco offers Fusion-ready drills with the coolant exit diameter, drill geometry and coating optimized for the delivery of rapidly expanding scCO₂. This combination of technologies provides a drastic reduction in drilling forces, allowing processes to be completely reconsidered.

MILLING APPLICATIONS
Improvements to lubrication can yield tremendous gains in milling applications, as they help to minimize the formation of built-up edge and chip welding, thereby reducing adhesion wear and abrasion. Additionally, steady and consistent cooling of the cutting zone reduces adhesion by minimizing material plasticity, improves tool life, and eliminates thermal cracking from temperature fluctuations. The combination of Pure-Cut technology and Seco milling tools achieves all of these benefits.

Additionally, milling with scCO₂ allows for removal of coolant from the cutting on biomedical implants, thus eliminating a time consuming cleaning process. It also yields burr-free parts in polymer materials, such as PEEK. With their tendency to flake a burr, these materials often require secondary processes that consume more time than is spent in the machine. Pure-Cut fully eliminates burrs and flakes from the process, resulting in substantial improvements to productivity and throughput.

Effectively milling with Pure-Cut technology requires careful consideration of coating, cutter geometry and coolant exit locations and sizes. Seco can identify the appropriate milling cutter to achieve the benefits of this new technology for your specific medical application.
The true test of a potential solution is its real world application. The following examples provide a sample of the documented results Secco products and processes have achieved.

**CASE STUDIES**

**FEMORAL CAP – MDT JETSTREAM TOOLING**

- **Material**: Cobalt chrome
- **Coolant**: Oil
- **Operation**: Finish-turn spherical outside diameter
- **Criterion**: Increase tool life
- **Fixturing**: Bespoke
- **Tool**: SDICR2525M11JET
- **Insert 1**: DCGT11T304-AL, TS2050

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>V&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f</th>
<th>a&lt;sub&gt;p&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>92 m/min</td>
<td>0.08 mm/rev</td>
<td>0.2 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Results**: Tripled tool life against grade CP200.

**STEM – SECO FEEDMAX**

- **Material**: Cobalt chrome
- **Coolant**: Oil
- **Operation**: Turn spherical outside diameter
- **Criterion**: Increase tool life
- **Fixturing**: Bar stock
- **Tool**: Custom Jetstream
- **Insert 1**: LCMF160404-0400-MG, CP500

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>V&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f</th>
<th>a&lt;sub&gt;p&lt;/sub&gt;</th>
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<tbody>
<tr>
<td></td>
<td>31 m/min</td>
<td>0.1 mm/rev</td>
<td>0.5 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Results**: Increased tool life by 300%.

**CUSTOM DRILL & CHAMFER**

- **Material**: Titanium alloy
- **Coolant**: Water soluble through coolant
- **Operation**: Drill & counterbore
- **Criterion**: Reduce cycle time
- **Fixturing**: Bespoke
- **Tool**: SD290A-7.21-835758, custom drill & chamfer

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>V&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f</th>
<th>L&lt;sub&gt;a&lt;/sub&gt;</th>
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<tbody>
<tr>
<td></td>
<td>29 m/min</td>
<td>0.025 mm/rev</td>
<td>7.5 mm</td>
<td>7.21 mm</td>
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</tr>
</tbody>
</table>

**Results**: Reduced cycle time by 65% by allowing increased cutting data and combining two operations.
**FEMORAL PART – JABRO HPM**

**Material:** Cobalt chrome  
**Coolant:** Water soluble  
**Operation:** Rough femoral part  
**Criterion:** Increase tool life  
**Fixturing:** Bespoke  
**Tool:** JHP992L080.0-SIRON-A  

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>Inch</th>
<th>V&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f</th>
<th>a&lt;sub&gt;i&lt;/sub&gt;</th>
<th>a&lt;sub&gt;e&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>56 m/min</td>
<td>184 sf/min</td>
<td>0.12 mm/rev</td>
<td>0.005&quot; ipr</td>
<td>0.79&quot;</td>
<td>0.015&quot;</td>
</tr>
</tbody>
</table>

**Results**  
Improved quality of surface finish while doubling tool life.

---

**BEARING INSERT – JABRO PREMIER FINISH TOOL**

**Material:** UHMWPE  
**Coolant:** Air  
**Operation:** Produce condyle surface  
**Criterion:** Provide surface quality of <32ra  
**Fixturing:** Bespoke  
**Tool:** Jabro carbide custom end mill  

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>Inch</th>
<th>V&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f</th>
<th>a&lt;sub&gt;i&lt;/sub&gt;</th>
<th>a&lt;sub&gt;e&lt;/sub&gt;</th>
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<tbody>
<tr>
<td></td>
<td>300 m/min</td>
<td>984 sf/min</td>
<td>0.1 mm/rev</td>
<td>0.004&quot; ipr</td>
<td>0.38 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Results**  
Reduced cycle time by 25% and increased tool life by 200%, while achieving the required surface finish.

---

**TIBIAL TRAY – JABRO CUSTOM TOOLING**

**Material:** Cobalt chrome  
**Coolant:** Water soluble  
**Operation:** Finish base of tibial tray  
**Criterion:** Improve surface finish quality  
**Fixturing:** Tombstone  
**Tool:** 8 mm Jabro Solid carbide custom end mill  

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>Inch</th>
<th>V&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f</th>
<th>a&lt;sub&gt;i&lt;/sub&gt;</th>
<th>a&lt;sub&gt;e&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 m/min</td>
<td>164 sf/min</td>
<td>0.171 mm/rev</td>
<td>0.007&quot; ipr</td>
<td>0.236&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**Results**  
Dramatic reduction in machining time compared to the existing traditional method.
### CASE STUDIES

#### PLATE – R220.21 HIGH FEED MILLING CUTTER

- **Material:** Ti6Al-4V
- **Operation:** Rough milling
- **Criterion:** Improve cost and productivity
- **Fixturing:** Mill turn
- **Tool:** R220.21-2.00-R160-4

<table>
<thead>
<tr>
<th>Insert 1:</th>
<th>218.19-160T-04-M08 F40M</th>
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<tbody>
<tr>
<td>Cutting data</td>
<td>n</td>
</tr>
<tr>
<td>Metric 458 rpm</td>
<td>73 m/min</td>
</tr>
<tr>
<td>Inch 458 rpm</td>
<td>240 sfm</td>
</tr>
<tr>
<td>Cutting data</td>
<td>a&lt;sub&gt;s&lt;/sub&gt;</td>
</tr>
<tr>
<td>Metric 0.9 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>Inch 0.035&quot;</td>
<td>1.18&quot;</td>
</tr>
</tbody>
</table>

**Results:** Reduced cycle time by 3.5 minutes and eliminated $9.80 of cost per part.

#### PLATE – SECO FEEDMAX SOLID CARBIDE DRILLS

- **Material:** Ti6Al-4V
- **Operation:** Drilling
- **Criterion:** Improve cost and productivity
- **Fixturing:** Mill turn
- **Tool:** SD203A-01095-039-0157R1

<table>
<thead>
<tr>
<th>Insert 1:</th>
<th>Solid carbide drill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting data</td>
<td>n</td>
</tr>
<tr>
<td>Metric 5300 rpm</td>
<td>46 m/min</td>
</tr>
<tr>
<td>Inch 5300 rpm</td>
<td>150 sfm</td>
</tr>
<tr>
<td>Cutting data</td>
<td>a&lt;sub&gt;s&lt;/sub&gt;</td>
</tr>
<tr>
<td>Metric 38 mm</td>
<td>400 mm/min</td>
</tr>
<tr>
<td>Inch 1.496&quot;</td>
<td>15.8 ipm</td>
</tr>
</tbody>
</table>

**Results:** Cycle time reduced by 30 seconds. Center drilling and peck drilling were eliminated.

#### BONE SCREW – JABRO MINI

- **Material:** 316 stainless steel
- **Operation:** Hexalobular milling
- **Criterion:** Improve cost and productivity
- **Fixturing:** Swiss with high frequency sub
- **Tool:** JM905L005-MEGA-T

<table>
<thead>
<tr>
<th>Insert 1:</th>
<th>0.5 mm solid end mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting data</td>
<td>n</td>
</tr>
<tr>
<td>Metric 52000 rpm</td>
<td>72 m/min</td>
</tr>
<tr>
<td>Inch 52000 rpm</td>
<td>253 sfm</td>
</tr>
<tr>
<td>Cutting data</td>
<td>a&lt;sub&gt;s&lt;/sub&gt;</td>
</tr>
<tr>
<td>Metric 0.3 mm</td>
<td>0.13 mm</td>
</tr>
<tr>
<td>Inch 0.0118&quot;</td>
<td>26 ipm</td>
</tr>
</tbody>
</table>

**Results:** Improved tool life in 316 stainless steel by 400% and reduced cycle time by 70%.
**BONE SCREW – JABRO MINI**

**Material:** Biodur stainless steel HRC41

**Coolant:** Oil

**Operation:** Hexalobular milling

**Criterion:** Improve cost and productivity

**Fixturing:** Swiss with high frequency sub

**Tool:** JM905L005-MEGA-T

**Insert 1:** 0.5 mm solid end mill

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>60000 rpm</td>
<td>60000 rpm</td>
</tr>
<tr>
<td>Vc</td>
<td>83 m/min</td>
<td>272 sfm</td>
</tr>
<tr>
<td>fz</td>
<td>0.0063 mm</td>
<td>0.00025&quot;</td>
</tr>
</tbody>
</table>

**Results:** Doubled tool life in Biodur stainless steel HRC41 and eliminated tool deflection for a more stable process.

---

**ABUTMENT – JABRO HFM**

**Material:** Ti 6Al-4V

**Coolant:** Emulsion

**Operation:** Roughing

**Criterion:** Optimization

**Fixturing:** Shrink holder

**Tool:** 980030-Mega

**Cutting data**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vc</td>
<td>120 m/min</td>
</tr>
<tr>
<td>fz</td>
<td>0.06 mm/tooth</td>
</tr>
</tbody>
</table>

**Results:** Reduced cycle time by 30% for roughing operations and increased tool life.

---

**ABUTMENT – JABRO MINI**

**Material:** Ti 6Al-4V

**Coolant:** Emulsion

**Operation:** Finishing

**Criterion:** Optimization to fit the connection holes

**Fixturing:** Shrink holder

**Tool:** 920TL015-MEGA-T

**Cutting data**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vc</td>
<td>150 m/min</td>
</tr>
<tr>
<td>fz</td>
<td>0.015 mm/tooth</td>
</tr>
</tbody>
</table>

**Results:** Reduced cycle time by 50%.
## Case Studies

### Crown – Jabro Mini

- **Material:** Ti 6Al-4V
- **Coolant:** Emulsion
- **Operation:** Finishing
- **Criterion:** Tool life
- **Fixturing:** Shrink holder
- **Tool:** 925SL010-MEGA-T

<table>
<thead>
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<th>Cutting data</th>
<th>( V_c )</th>
<th>( f_r )</th>
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</thead>
<tbody>
<tr>
<td>Metric</td>
<td>150 m/min</td>
<td>0.02 mm/tooth</td>
</tr>
<tr>
<td>Inch</td>
<td>492 sfm</td>
<td>0.0008” ipt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>( a_n )</th>
<th>( a_p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>10%</td>
<td>0.05 mm</td>
</tr>
<tr>
<td>Inch</td>
<td>10%</td>
<td>0.0019</td>
</tr>
</tbody>
</table>

**Results:** Increased tool life by 30%.

### Crown – Jabro Mini Diamond

- **Material:** Zirconia
- **Coolant:** Emulsion
- **Operation:** Roughing
- **Criterion:** Tool life
- **Fixturing:** Shrink holder
- **Tool:** 630L020-DIAMOND

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>( V_c )</th>
<th>( f_r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>230 m/min</td>
<td>0.02 mm/tooth</td>
</tr>
<tr>
<td>Inch</td>
<td>754 sfm</td>
<td>0.0008” ipt</td>
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<table>
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<th>( a_p )</th>
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</thead>
<tbody>
<tr>
<td>Metric</td>
<td>50%</td>
<td>0.25 mm</td>
</tr>
<tr>
<td>Inch</td>
<td>50%</td>
<td>0.0098</td>
</tr>
</tbody>
</table>

**Results:** Increased tool life by 60%.

### Bridge – Jabro HFM

- **Material:** Ti 6Al-4V
- **Coolant:** Emulsion
- **Operation:** Roughing
- **Criterion:** Optimization
- **Fixturing:** Shrink holder
- **Tool:** 980040-Mega

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>( V_c )</th>
<th>( f_r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>120 m/min</td>
<td>0.08 mm/tooth</td>
</tr>
<tr>
<td>Inch</td>
<td>394 sfm</td>
<td>0.0032” ipt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>( a_n )</th>
<th>( a_p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>75% to 100%</td>
<td>0.18 mm</td>
</tr>
<tr>
<td>Inch</td>
<td>75% to 100%</td>
<td>0.0071</td>
</tr>
</tbody>
</table>

**Results:** Reduced cycle time by 50%.
### BRIDGE – JABRO HFM

<table>
<thead>
<tr>
<th>Material:</th>
<th>CrCo</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Emulsion</td>
</tr>
<tr>
<td>Operation:</td>
<td>Roughing</td>
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<tr>
<td>Criterion:</td>
<td>Tool life</td>
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<td>Fixturing:</td>
<td>Shrink holder</td>
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<tr>
<td>Tool:</td>
<td>180ML040R100Z4-MEGA-64</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Vc</td>
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<td>328 sfm</td>
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<tr>
<td>fz</td>
<td>0.06 mm/tooth</td>
<td>0.00236&quot; ipt</td>
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<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Metric</th>
<th>Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>ae</td>
<td>75% to 100%</td>
<td>75% to 100%</td>
</tr>
<tr>
<td>ap</td>
<td>0.15 mm</td>
<td>0.006&quot;</td>
</tr>
</tbody>
</table>

**Results**

Increased tool life by 60% while cutting cycle time by 30%.

---

### BAR – CUSTOM TOOLING

<table>
<thead>
<tr>
<th>Material:</th>
<th>Ti 6Al-4V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant:</td>
<td>Emulsion</td>
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<tr>
<td>Operation:</td>
<td>Finishing</td>
</tr>
<tr>
<td>Criterion:</td>
<td>Connection profile</td>
</tr>
<tr>
<td>Fixturing:</td>
<td>Shrink holder</td>
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<tr>
<td>Tool:</td>
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<table>
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<td>fz</td>
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<table>
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<tr>
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</tr>
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<tbody>
<tr>
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<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>ap</td>
<td>0.18 mm</td>
<td>0.0071&quot;</td>
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**Results**

Reduced cycle time by 80%.

---

### BAR – JABRO HFM

<table>
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<td>Operation:</td>
<td>Roughing</td>
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<tr>
<td>Criterion:</td>
<td>Optimization</td>
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<tr>
<td>Fixturing:</td>
<td>Shrink holder</td>
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<tr>
<td>Tool:</td>
<td>980040-Mega</td>
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<table>
<thead>
<tr>
<th>Cutting data</th>
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<tr>
<td>Vc</td>
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<tr>
<td>fz</td>
<td>0.08 mm/tooth</td>
<td>0.0032&quot; ipt</td>
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<th>Inch</th>
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<tbody>
<tr>
<td>ae</td>
<td>75% to 100%</td>
<td>75% to 100%</td>
</tr>
<tr>
<td>ap</td>
<td>0.18 mm</td>
<td>0.0071&quot;</td>
</tr>
</tbody>
</table>

**Results**

Reduced cycle time by 50%.
When striving to perfect a manufacturing process, having the right tooling partner is critical. Seco provides an extensive unique engineering service, with full applications support and the necessary expertise to understand your productivity requirements and deliver a winning solution.
INTEGRATED ENGINEERING SUPPORT

Seco’s Component Engineered Tooling (CET) offers a comprehensive approach to process design and optimization that ensures you achieve the highest levels of productivity, efficiency and cost effectiveness. Specializing in project management from conception to completion, the globally networked CET teams work together with our customers, and can integrate relevant representatives from providers of complementary equipment, such as machine tools, workholding and automation systems.

DOCUMENTED PROCESS OPTIMIZATION

Through our proven and constantly refined approach to analysis, we can transform your cutting data into reports that demonstrate actual cost and time savings. Tools such as our Productivity and Cost Analysis (PCA) software allow us to benchmark existing processes and compare them to projected and realized savings from proposed improvements. These tools are fully scalable, from assessing a single machining application to evaluating workflows throughout your facility.

TAILOR-MADE SOLUTIONS

Seco will ensure that you always get the ultimate tooling solution best suited to your individual requirement, whether it is for standard tooling products or tailor-made solutions. Seco Custom Tooling offers complete support to you in these situations, analyzing your application and developing a unique solution around it. With 19 state-of-the-art production facilities worldwide, Seco Custom Tooling is always available to make your challenge our priority.
100% RELIANCE
Seco is fully committed to continuously improving to set new standards in Quality Assurance as is evident in our global ISO 9001 certification. We rigorously evaluate our processes to ensure that every product we produce is capable of meeting and exceeding our customers’ expectations. Our total commitment to quality is evident in the level of documentation we provide which meets the vigorous requirements of traceability set by our customers. When you partner with Seco, quality becomes a constant you can count on.
LONG-TERM SUSTAINABILITY
Seco has established and maintains a used carbide Recycling Program with a commitment to minimizing our environmental footprint and conserving non-renewable materials. All aspects of this program operate within the principles of our ISO 14001 certification, and we make it easy for you to participate. When you recycle used carbide, you not only positively impact the environment, you also recoup a portion of your original expense and help us minimize the cost of tools in the future.

KEEPING THE CUTTING EDGE
Tool Reconditioning is critical to maintain the quality standards required on your workpiece but often, when a tool is removed from use as it shows signs of wear, this means discarding an entire cutter when only a small portion of it has been worn. Seco’s tool reconditioning service eliminates this potential waste by applying advanced regrinding and recoating processes to bring a tool’s geometry, edge preparation and coating back to its original specifications.

INVENTORY MANAGEMENT
Using Seco Point™, inventory management is simple and efficient. Our user-friendly, point-of-use tool dispensers track and monitor tool consumption and inventory levels. Inventory replenishment can be automated and you receive reports that make it easy to identify where consumption can be reduced.
BUILD EXPERTISE

GLOBAL COMPETENCE CENTERS

SECO GLOBAL TECHNICAL CENTERS
Seco’s Technical Centers give you easy access to tooling expertise and knowledge, product introductions, industry specific events and customer engineered solutions for specific applications. Here is also where Seco representatives from diverse nations gather to share information and discuss winning solutions developed in their home markets, working together to ensure that we understand and are prepared for the trends and challenges you face.
SECO TECHNICAL EDUCATION PROGRAM (STEP)
Available at our global technical centers or on-site at your own facility, Seco STEP provides training courses on every aspect of metal cutting, at every level of expertise. Whether instructing your apprentices on the basics of cutting processes or helping your experts stay abreast of the latest technological innovations, Seco STEP is an invaluable resource in maximizing workforce knowledge.

SECOTOOLS.COM
Through a user-friendly and intuitive online presence, Secotools.com supports your medical operations with a wealth of information including product and process data, technical expertise, videos and downloadable literature to help you improve productivity and navigate complex metalworking processes.

One of the website’s significant features is Suggest, an advanced online product selection tool that guides you to the right metalcutting solutions perfectly matched to your unique application requirements. Based on your input, Suggest quickly identifies and provides you with a complete tooling recommendation. Then, the Seco Online Store enables smooth, fast and easy ordering through quick access to real-time product, pricing, discount, and local stock availability information.

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