

# INNOVATIVE TOOLING SOLUTIONS





### **ENHANCE YOUR COMPETITIVENESS**

## MEDICAL MANUFACTURING EXCELLENCE AND INNOVATION

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.** 

	Introduction Medical trends	
	Orthopedic implant components	
	Dental implant components	
	Orthopedic implant applications	
	Dental implant applications	
	Fusion coolant	
	Case studies	
This brochure includes	Seco's engineering services	
component photos by kind	Seco's business services	
permission of Willemin Macodel	Global competence centers	
SA, Switzerland.	Seco's online resources	



### **MEDICAL MANUFACTURING**

## MEET THE DEMANDS OF Worldwide Growth

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.



# KNEE Replacement Components







#### **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
- Maximized 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



#### 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<sup>™</sup> 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<sup>™</sup> 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<sup>™</sup> 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



## KNEE REPLACEMENT Components: Bearing insert



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



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





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



### KNEE REPLACEMENT Components: Tibial tray



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







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-Solid<sup>2</sup>

#### **YOUR CHALLENGES:**

- Maximize productivity
- Optimize process security

#### YOUR SOLUTION:

Jabro-Solid<sup>2</sup> 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: Abutment

#### 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

#### 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



FINISHING OPERATIONS Jabro-Solid<sup>2</sup>

#### **YOUR CHALLENGES:**

- Maximize productivity
- Optimize process security

#### **YOUR SOLUTION:**

Jabro-Solid<sup>2</sup> 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

30





### DENTAL IMPLANT Components: Crown



#### **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



### DENTAL IMPLANT Components: Bridge



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



Jabro Mini

#### **YOUR CHALLENGE:**

- 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-Solid<sup>2</sup>

#### **YOUR CHALLENGES:**

- Maximize productivity
- Optimize process security

#### **YOUR SOLUTION:**

Jabro-Solid<sup>2</sup> 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



### DENTAL IMPLANT Components: Bar



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



#### **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-Solid<sup>2</sup>

#### **YOUR CHALLENGES:**

- Maximize productivity
- Optimize process security

#### **YOUR SOLUTION:**

Jabro-Solid<sup>2</sup> 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



### **MEDICAL MANUFACTURING**

# COMBINING INNOVATIONS TO CREATE SUPERIOR PROCESSES

Seco has partnered with Fusion Coolant Systems, the developer of a revolutionary patented coolant system that harnesses supercritical carbon dioxide (scCO<sub>2</sub>) 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, scCO<sub>2</sub> 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 CO<sub>2</sub> 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 scCO<sub>2</sub>, 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 –

scCO<sub>2</sub> provides the perfect amount of heat removal and avoids altering part dimensions. Systems based on air, water or oil are too warm, while liquid CO<sub>2</sub> and liquid nitrogen are too cold.

#### Faster machining -

 $scCO_2$  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, scCO<sub>2</sub> 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. scCO<sub>2</sub> removes these harmful effects from the equation. And scCO<sub>2</sub> has a low carbon footprint since the CO<sub>2</sub> used is a recovered waste product of other applications.





### **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.

#### **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.



#### **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 scCO<sub>2</sub>. 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 scCO<sub>2</sub> 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.





## CASE Studies

The true test of a potential solution is its real world application. The following examples provide a sample of the documented results Seco products and processes have achieved.

#### ACETABULAR CUP – Seco turning grade ts2050

Material:	Cobalt chrome			
Coolant:	0il			
Operation:	Finish-tu	rn spherical ou	tside diameter	
Criterion:	Increase	tool life		
Fixturing:	Bespoke			
Tool:	SDJCR2525M11JET			
Insert 1:	DCGT11T	304-AL, TS2050	)	
Cutting		Vc	f	ap
data	Metric	92 m/min	0.08 mm/rev	0.2 mm
	Inch	302 sf/min	0.003" ipr	0.008"
Results	Tripled	tool life agains	t grade CP200.	

FEMORAL CAP - MDT JETSTREAM TOOLING

LCMF160404-0400-MG, CP500

 $V_{\text{c}}$ 

31 m/min

100 sf/min

Increased tool life by 300%.

f

0.1 mm/rev

0.004" ipr

a<sub>p</sub> 0.5 mm

0.02"

Material: Cobalt chrome

0il

Criterion: Increase tool life

Bar stock

Metric

Inch

Operation: Turn spherical outside diameter

Custom Jetstream

Coolant:

Fixturing:

Insert 1: Cutting

Results

Tool:

data











#### STEM – SECO FEEDMAX Custom drill & Chamfer

Material:	Titanium alloy				
Coolant:	Water so	luble, throug	h coolant		
Operation:	Drill & co	ounterbore			
Criterion:	Reduce c	ycle time			
Fixturing:	Bespoke				
Tool:	SD290A-	7.21-835758	8, custom drill	& chamfer	
Cutting		Vc	f	$L_4$	D
data	Metric	29 m/min	0.025 mm/rev	7.5 mm	7.21 mm
	Inch 95 sf/min 0.001" ipr 0.296" 0.284"				
Results Reduced cycle time by 66% by allowing increased cutting data and combining two operations.					



#### FEMORAL PART – JABRO HPM

Results	Improve	d quality of tool life.	surface finish	while	
	Inch	184 sf/min	0.005" ipr	0.79"	0.015"
data	Metric	56 m/min	0.12 mm/rev	20 mm	0.38 mm
Cutting		V <sub>c</sub>	f	ap	a <sub>e</sub>
Tool:	JHP992L	080.0-SIRON	-A		
Fixturing:	Bespoke				
Criterion:	Increase	tool life			
Operation:	Rough fe	moral part			
Coolant:	Water so	luble			
Material:	Cobalt cl	nrome			







#### BEARING INSERT -Jabro Premier Finish tool

Results	Reduce 200%, v	d cycle time by vhile achieving	35% and increas the required surf	ed tool life by ace finish.
	Inch	984 sf/min	0.004" ipr	0.02"
data	Metric	300 m/min	0.1 mm/rev	0.5 mm
Cutting		Vc	f	a <sub>e</sub>
Tool:	Jabro car	bide custom er	nd mill	
Fixturing:	Bespoke			
Criterion:	Provide s	urface quality	of <32ra	
Operation:	Produce	condyle surface	9	
Coolant:	Air			
Material:	UHMWPE			







#### TIBIAL TRAY – JABRO CUSTOM TOOLING

Results	Dramatic reduction in machining time compared to the existing traditional method.				
Desalle	Inch   164 sf/min   0.007" ipr   0.002"   0.236"				
data	Metric	50 m/min	0.171 mm/rev	0.05 mm	6 mm
Cutting		Vc	f	ap	ae
Tool:	8 mm Ja	8 mm Jabro Solid carbide custom end mill			
Fixturing:	Tombsto	ne			
Criterion:	Improve	surface finish	quality		
Operation:	Finish b	ase of tibial tr	ау		
Coolant:	Water so	oluble			
Material:	Cobalt chrome				



## CASE Studies

PLATE -	- R220	).21 HIGH F	EED MILLING	CUTTER
Material:	Ti6AI-4	V		
Coolant:	Flood			
Operation:	Rough	milling		
Criterion:	Improve	e cost and produ	ictivity	
Fixturing:	Mill tur	n		
Tool:	R220.2	1-2.00-R160-4		
Insert 1:	218.19	-160T-04-M08 F	40M	
Cutting		n	Vc	fz
data	Metric	458 rpm	73 m/min	1.0 mm
	Inch	458 rpm	240 sfm	0.039"
Cutting		ae	ap	Vf
data	Metric	0.9 mm	30 mm	1.900 mm/min
	Inch	0.035"	1.18"	74.8 ipm
Results	Reduce \$9.80 o	ed cycle time by of cost per part.	/ 3.5 minutes and	eliminated

#### PLATE – SECO FEEDMAX Solid Carbide Drills

Material:	Ti6AI-4	V		
Coolant:	Water s	oluble, through-	coolant	
Operation:	Drilling			
Criterion:	Improve	e cost and produ	ctivity	
Fixturing:	Mill tur	n		
Tool:	SD2034	A-01095-039-01	57R1	
Insert 1:	Solid ca	arbide drill		
Cutting		n	Vc	fz
data	Metric	5300 rpm	46 m/min	0.076 mm
	Inch	5300 rpm	150 sfm	0.003"
Cutting		ap	Vf	
data	Metric	38 mm	400 mm/min	
	Inch	1.496"	15.8 ipm	
Results Cycle time reduced by 30 seconds. Center drilling and peck drilling were eliminated.				

#### BONE SCREW – JABRO MINI

Results	Improv reduce	red tool life in 31 d cycle time by	6 stainless stee 70%.	l by 400% and
	Inch	0.0118"	0.0051"	26 ipm
data	Metric	0.3 mm	0.13 mm	660 mm/min
Cutting		a <sub>e</sub>	a <sub>p</sub>	V <sub>f</sub>
	Inch	52000 rpm	253 sfm	0.00012"
data	Metric	52000 rpm	72 m/min	0.003 mm
Cutting		n	Vc	fz
Insert 1:	0.5 mm	solid end mill		
Tool:	JM905L	.005-MEGA-T		
Fixturing:	Swiss v	vith high frequen	cy sub	
Criterion:	Improve	e cost and produc	ctivity	
Operation:	Hexalob	oular milling		
Coolant:	0il			
Material:	316 sta	inless steel		
DONL 3	GULM	- JADKO IMI	INI	















ML



#### BONE SCREW – JABRO MINI

Results Doubled tool life in Biodur stainless steel HRC41 and eliminated tool deflection for a more stable proess.					
	Inch	0.0118"	0.0012"	22.8 ipm	
data	Metric	0.3 mm	0.03 mm	580 mm/min	
Cutting		a <sub>e</sub>	ap	Vf	
	Inch	60000 rpm	272 sfm	0.00025"	
data	Metric	60000 rpm	83 m/min	0.0063 mm	
Cutting		n	Vc	fz	
Insert 1:	0.5 mm	solid end mill			
Tool:	JM905L	.005-MEGA-T			
Fixturing:	Swiss v	vith high freque	ncy sub		
Criterion:	Improve	e cost and produ	uctivity		
Operation:	Hexalot	oular milling			
Coolant:	0il				
Material:	Biodur	Biodur stainless steel HRC41			











#### ABUTMENT - JABRO HFM

Ti 6AI-4	V	
Emulsio	on	
Roughi	ng	
Optimiz	ation	
Shrink	holder	
980030	-Mega	
	Vc	fz
Metric	120 m/min	0.06 mm/tooth
Inch	394 sfm	0.00236" ipt
	a <sub>e</sub>	ap
Metric	75% to 100%	0.15 mm
Inch	75% to 100%	0.006"
Reduce and inc	d cycle time by 30% fo reased tool life.	r roughing operations
	Ti 6AI-4 Emulsic Roughin Optimiz Shrink I 980030 Metric Inch Metric Inch Reduce and inc	Ti 6AI-4V   Emulsion   Roughing   Optimization   Shrink holder   980030-Mega   Vc   Metric   120 m/min   Inch   394 sfm   ae   Metric   75% to 100%   Reduced cycle time by 30% fo   and increased tool life.

#### ABUTMENT – JABRO MINI

Material:	Ti 6AI-4V		
Coolant:	Emulsio	n	
Operation:	Finishir	Ig	
Criterion:	Optimiz	ation to fit the connecti	on holes
Fixturing:	Shrink I	nolder	
Tool:	920TL0	15-MEGA-T	
Cutting		Vc	fz
data	Metric	150 m/min	0.015 mm/tooth
	Inch	492 sfm	0.00059" ipt
Cutting		a <sub>e</sub>	ap
data	Metric	70%	0.08 mm
	Inch	70%	0.0032"
Results	Reduced	d cycle time by 50%.	





## CASE Studies

CROWN	— JAB	RO MINI	
Material:	Ti 6AI-4	۰ ۷	
Coolant:	Emulsion		
Operation:	Finishing		
Criterion:	Tool life		
Fixturing:	Shrink holder		
Tool:	925SL010-MEGA-T		
Cutting		Vc	f <sub>z</sub>
data	Metric	150 m/min	0.02 mm/tooth
	Inch	492 sfm	0.0008" ipt
Cutting		a <sub>e</sub>	a <sub>p</sub>
data	Metric	10%	0.05 mm
	Inch	10%	0.0019"
Results	Increas	ed tool life by 30%.	













#### CROWN – JABRO MINI DIAMOND

Material:	Zirconia		
Coolant:	Emulsion		
Operation:	Roughing		
Criterion:	Tool life		
Fixturing:	Shrink holder		
Tool:	650L020-DIAMOND		
Cutting		Vc	fz
data	Metric	230 m/min	0.02 mm/tooth
	Inch	754 sfm	0.0008" ipt
Cutting		a <sub>e</sub>	ap
data	Metric	50%	0.25 mm
	Inch	50%	0.0098"
Results	Increas	ed tool life by 60%.	

#### BRIDGE – JABRO HFM

Material:	Ti 6AI-4	V		
Coolant:	Emulsion			
Operation:	Roughing			
Criterion:	Optimization			
Fixturing:	Shrink holder			
Tool:	980040-Mega			
Cutting		Vc	fz	
data	Metric	120 m/min	0.08 mm/tooth	
	Inch	394 sfm	0.0032" ipt	
Cutting		ae	ap	
data	Metric	75% to 100%	0.18 mm	
	Inch	75% to 100%	0.0071"	
Results	Reduce	d cycle time by 50%.		





#### **BRIDGE – JABRO HFM** Material: CrCo Coolant: Emulsion Operation: Roughing Criterion: Tool life Fixturing: Shrink holder Tool: 180ML040R100Z4-MEGA-64 Cutting ۷ $\boldsymbol{f}_{\boldsymbol{z}}$ Metric data 100 m/min 0.06 mm/tooth 0.00236" ipt Inch 328 sfm ap Cutting ae data 75% to 100% 0.15 mm Metric 75% to 100% 0.006" Inch Increased tool life by 60% while cutting cycle Results time by 30%.













#### BAR – CUSTOM TOOLING

Material:	Ti 6Al-4	V	
Coolant:	Emulsion		
Operation:	Finishing		
Criterion:	Connection profile		
Fixturing:	Shrink holder		
Tool:	CT-JPM-02846978		
Cutting		Vc	fz
data	Metric	70 m/min	0.08 mm/tooth
	Inch	229 sfm	0.0031" ipt
Cutting		ae	ap
data	Metric	100%	0.18 mm
	Inch	100%	0.0071"
Results	Reduce	d cycle time by 80%.	

#### BAR – JABRO HFM

Material:	Ti 6AI-4V		
Coolant:	Emulsion		
Operation:	Roughing		
Criterion:	Optimization		
Fixturing:	Shrink holder		
Tool:	980040-Mega		
Cutting		Vc	fz
data	Metric	120 m/min	0.08 mm/tooth
	Inch	394 sfm	0.0032" ipt
Cutting		ae	ap
data	Metric	75% to 100%	0.18 mm
	Inch	75% to 100%	0.0071"
Results	Reduce	d cycle time by 50%.	



### **SOLUTIONS MADE FOR YOU**

## SECO'S Engineering Services

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.

#### NETWORK OF Application experts

Through our global network of international specialists, we maintain an in-depth knowledge and understanding of relevant industry segments. This group works with our locally based Seco application experts to ensure that you get the very best support for the component you are machining.



#### 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.



### **DELIVERING PERSONAL COMMITMENT**

# SECO'S BUSINESS Services

#### **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**<sup>™</sup>, 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 realtime product, pricing, discount, and local stock availability information.

Scan this code to see more. www.secotools.com





#### SECO TOOLS AB SE-737 82 FAGERSTA, SWEDEN TEL. +46 223 400 00 WWW.SECOTOOLS.COM

03188778, ST20176638 GB, © SECO TOOLS AB, 2017. All rights reserved. Technical specifications are subject to change without notice.

