

**AUTOMOTIVE**

**INNOVATIVE TOOLING  
SOLUTIONS FOR  
ENGINE COMPONENTS**



## ENHANCING YOUR COMPETITIVENESS

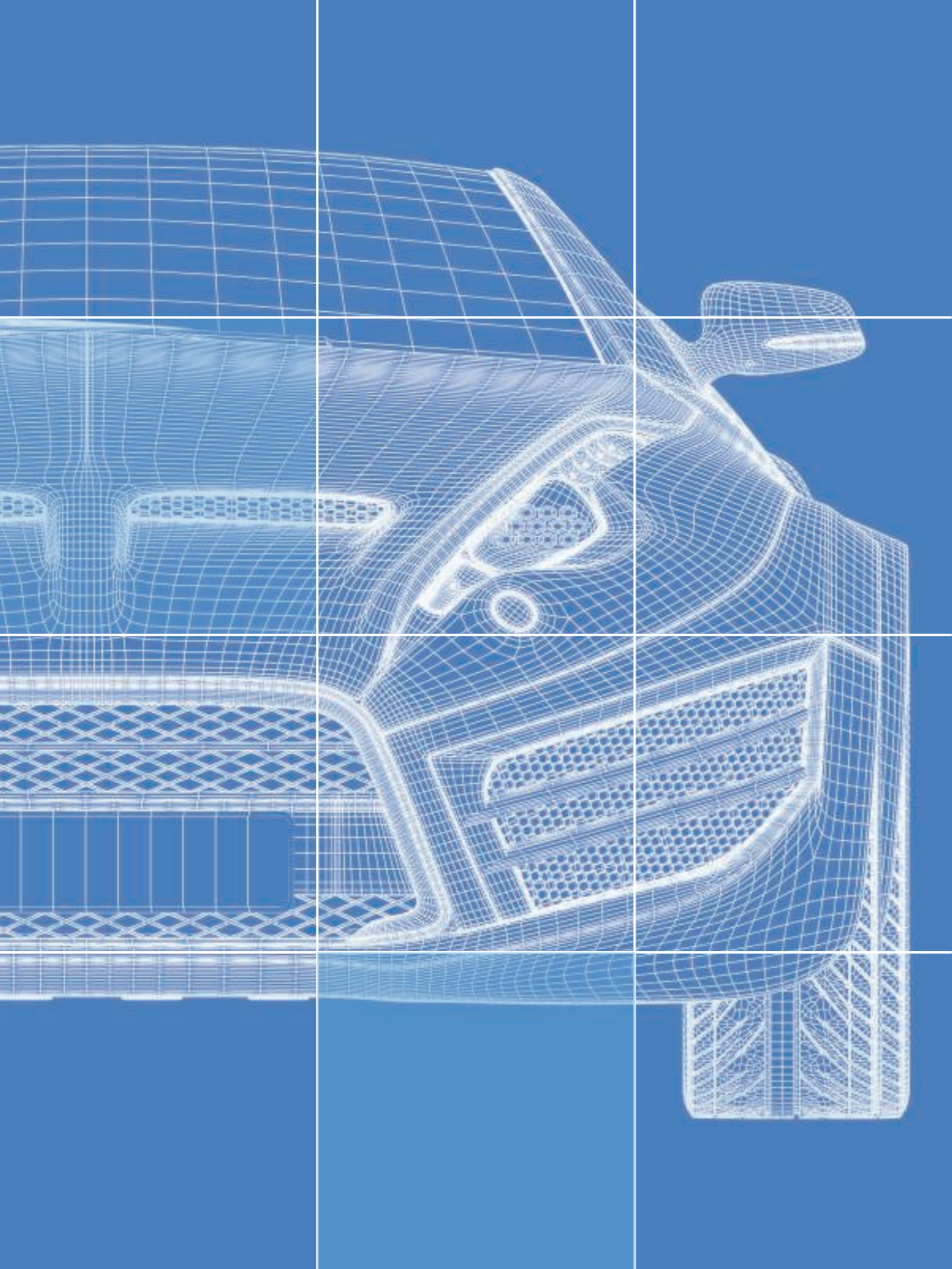
# DELIVERING EXCELLENCE AND INNOVATION FOR AUTOMOTIVE MANUFACTURERS

Seco works closely with automotive 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 automotive 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, holmaking, 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. Whatever challenges you encounter, our team is always nearby to help you overcome them 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 automotive web site at [www.secotools.com/automotive](http://www.secotools.com/automotive).

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## SUPPLYING AUTOMOTIVE

# TRENDS IN AUTOMOTIVE

With high oil prices, concerns over a lack of future energy supplies and a desire for a cleaner environment, consumers view fuel efficiency a top priority when buying a new vehicle. Therefore, the automotive industry is looking to further accelerate its engineering efforts to better accommodate a “green” agenda.

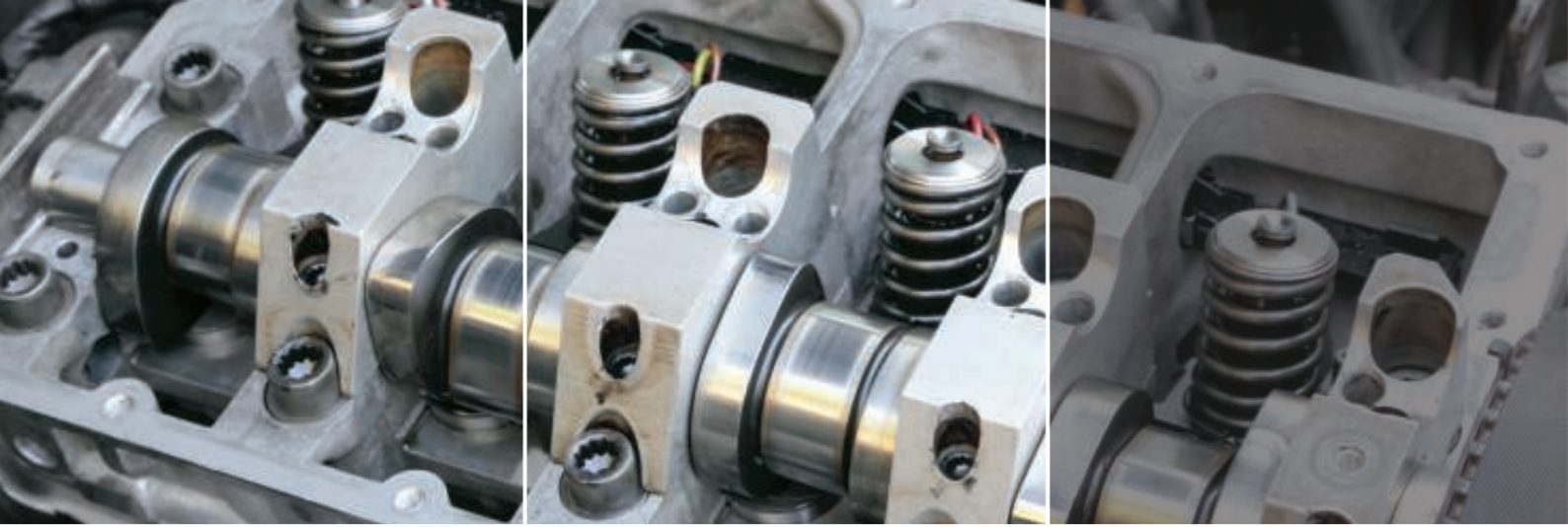
While current hybrids and electric cars demonstrate the industry’s commitment to fuel efficiency improvements, alternative fuel technologies and environmental issues, the high cost of purchasing such vehicles will most likely keep petroleum and diesel-based automobiles dominating the market until at least 2020.

It appears that hybrids and electric cars have the biggest growth potential of any vehicle category over the next five years; however, many industry experts believe government subsidies are necessary for a successful roll-out of more economical hybrid and electric cars. Without subsidies, and compared to traditional fuel vehicles, it’s unlikely that we will see ‘affordable’ electric powered cars until after 2015.

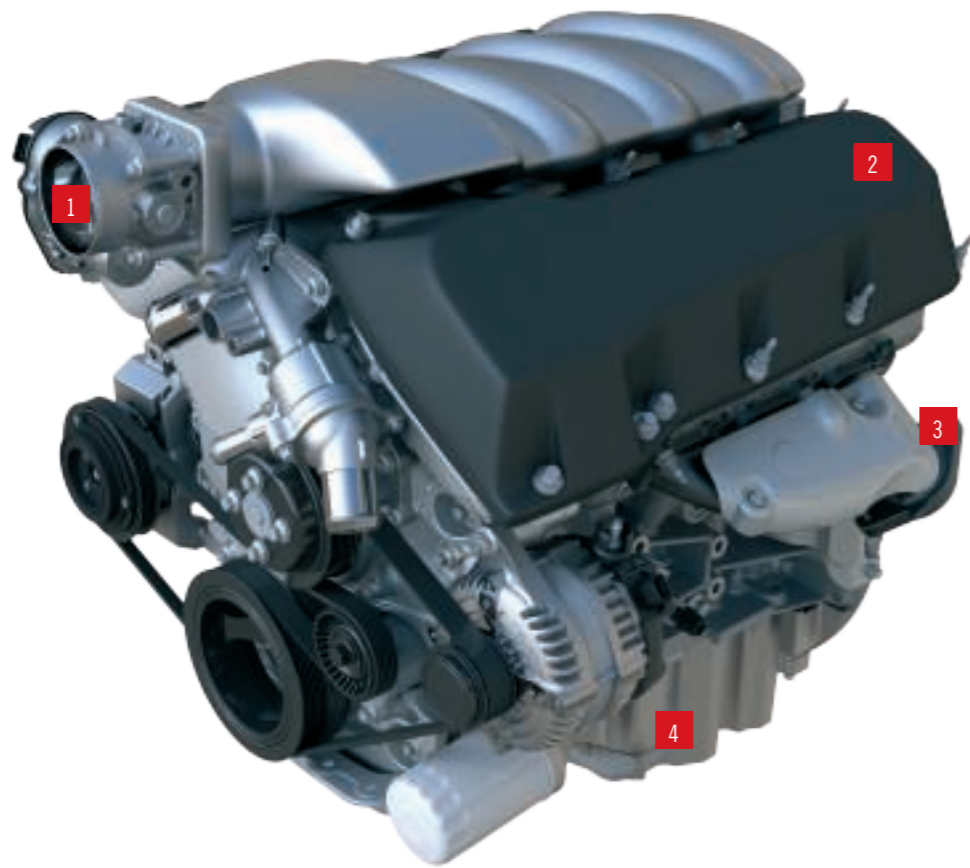
Continuing to develop technologies that will produce efficient, reliable and affordable hybrid and electric vehicles is a common thread among automotive manufacturers worldwide. Those companies that take a forward-thinking approach will gain a competitive advantage and secure a leadership position in a realigned automotive value chain.

At Seco, we partner with OEMs and other vehicle-based organisations around the globe to help automotive manufacturers overcome their challenges through world-class cutting tool solutions. Whether we’re assisting in reducing costs on a cylinder head application, developing new ways to cut challenging engine materials or improving productivity on a brake caliper component, our advanced technologies, tools, strategies and component solutions can help drive the automotive industry’s success.

As the automotive industry continues to innovate towards more efficient and environmentally friendly vehicle performance, Seco will be there to help you meet and overcome any metal cutting challenges within your operations.



# ENGINE COMPONENTS



1



## TURBOCHARGER

Used to generate increased engine power and made from heat resistant stainless steels, turbochargers are complex and difficult components to machine. They require sophisticated, custom tools such as high precision reamers and dedicated carbide grades. Processing includes tight-tolerance holmaking and generating superior surface finishes.

2



## CYLINDER HEAD

Cylinder head designs are key to reducing fuel emissions and meeting strict government regulations. As a result, the components place high demands on processing quality. The components involve extremely complex and demanding machining operations, as well as custom tooling.

3



## CONNECTING ROD

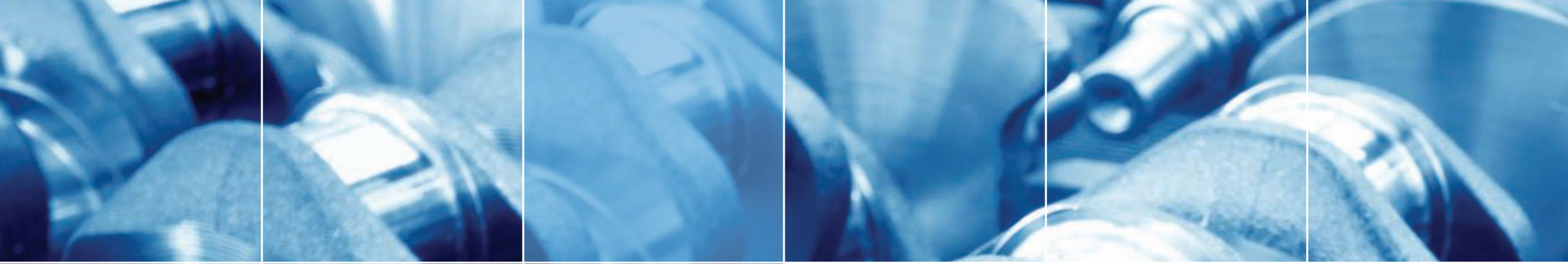
As the critical link between engine crankshaft and piston, connecting rods are forged and split into two parts by either a sawing or cracking process. Machining requires extremely strong and stable precision tooling and machines.

4

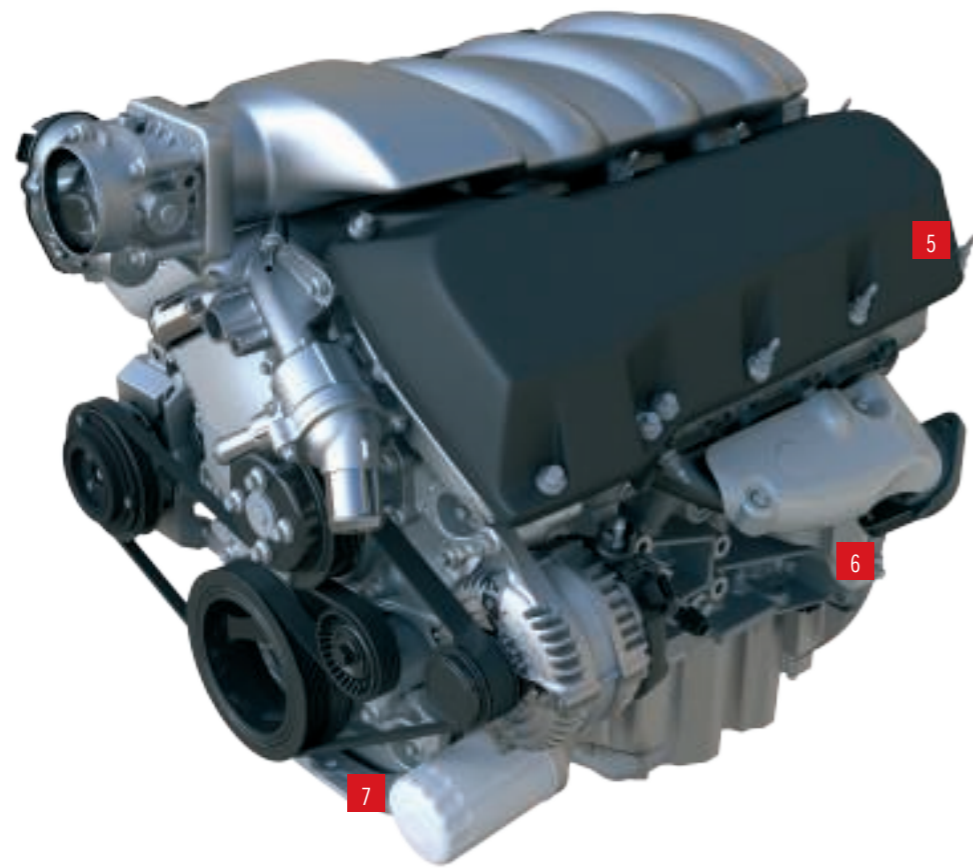


## BEARING CAP

Bearing caps contain the main bearings of an engine's crankshaft. As part of their required processing, bearing caps must undergo a tough splitting operation, requiring strong and stable operations. Tooling for bearing cap machining is highly complex and often custom in nature.



# ENGINE COMPONENTS



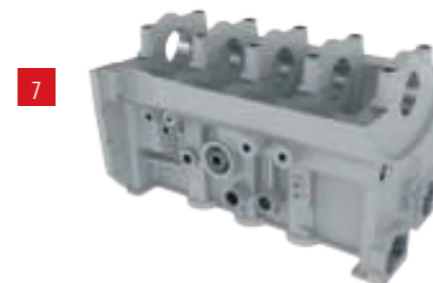
## PISTON

Pistons are made from aluminium with high silicon content, resulting in a very abrasive material. Machining such material requires high wear resistant tooling, such as cutters and inserts made of PCD.



## CRANKSHAFT

As one of the most challenging engine components, a crankshaft involves multiple production processes using complex custom tooling. Critical to translating reciprocating linear piston motion into rotation, crankshafts demand the highest possible quality control and exacting tolerances.



## CYLINDER BLOCK

Cylinder blocks house the various main parts of an engine, such as liners and coolant passages. Block designs are often conceptually distinct and involve various different materials requiring bi-metal machining operations, as well as complex production processes and sophisticated high precision tooling.

**YOUR MANUFACTURING CHALLENGES:**

- Minimising tool cost per piece when productively drilling numerous holes
- Reaming precise holes with perfect surface finishes
- Ensuring high productivity during turning of the outer diameter and face
- Copying the back profile with high productivity and reliability



# MACHINING ENGINE COMPONENTS: TURBOCHARGER



**PERFOMAX® DRILL**

**YOUR CHALLENGE:**

Minimising tool cost per piece when productively drilling numerous holes.

**OUR SOLUTION:**

With strong indexable inserts and a highly stable, low-friction coated drill body, PerfoMax achieves excellent productivity and economic performance. The drills feature optimised geometries to eliminate deflection and provide high chip evacuation. Your benefits include increasing throughput and minimising tool cost per part.



**SECO REAMING SOLUTIONS**

**YOUR CHALLENGE:**

Reaming precise holes with perfect surface finishes.

**OUR SOLUTION:**

An interchangeable head reamer, Precimaster™ minimises cost per hole while providing excellent results. Additionally, our Nanofix™, Prefix™ and Xfix™ lines fill out our range of reaming products, guaranteeing a productive and high quality solution for holes ranging from 2.97 mm to 155 mm in diameter. Your benefits include reducing costs while maintaining exacting tolerances and surface finish requirements.



**SECO-CAPTO™ TURNING TOOL**

**YOUR CHALLENGE:**

Ensuring high productivity during turning of the outer diameter and face.

**OUR SOLUTION:**

The flexible Seco-Capto quick change turning head system reduces tool change times and can be error-proof modified for mass production applications. Offering highly rigid and accurate performance, the system also enables full automation of presetting by adding electronic data chips to the tool holders. Additionally, using ISO/ANSI Duratomic® inserts maximises chip removal rate for this application. Your benefits include reliable accuracy and increased efficiency.



**CUSTOM SECO-CAPTO™ TURNING TOOL**

**YOUR CHALLENGE:**

Copying the back profile with high productivity and reliability.

**OUR SOLUTION:**

The flexible Seco-Capto quick change turning head system reduces tool change times and can be error-proof modified for mass production applications. Offering highly rigid and accurate performance, the system also enables full automation of presetting by adding electronic data chips to the tool holders. Additionally, applying MDT coated inserts maximises chip removal rate for this application. Your benefits include reliable accuracy and increased efficiency.

**YOUR MANUFACTURING CHALLENGES:**

- Roughing component faces with the highest possible productivity and reliability
- Minimising cycle time and maintaining reliability for grooving operations
- Efficiently and securely turning the internal diameter and face



# MACHINING ENGINE COMPONENTS: TURBOCHARGER



**R220.29 COPY MILLING CUTTER**

**YOUR CHALLENGE:**

Roughing component faces with the highest possible productivity and reliability.

**OUR SOLUTION:**

With features perfect for the challenges faced in rough milling turbochargers, the R220.29 copy milling cutter incorporates carbide inserts with strong cutting edges. Round inserts maximise process security and stability, as well as offering improved cost performance by allowing the use of more insert edges. Your benefits include a highly reliable process with minimal cycle times and costs.



**SECO-CAPTO™ MDT AXIAL GROOVING TOOL**

**YOUR CHALLENGE:**

Minimising cycle time and maintaining reliability for grooving operations.

**OUR SOLUTION:**

With a top clamp and serrated contact surfaces between the insert and tool holder, Secoloc insert clamping provides the MDT system with superb stability, which is then further enhanced through the use of long inserts. The Seco-Capto interface adds tremendous flexibility, and the ability to move to full automation by adding electronic data chips to the tool holders. MDT coated carbide inserts optimise chip removal rates in this application. Your benefits include robust performance, high process security and shorter cycle times.



**SECO-CAPTO™ BORING TOOL**

**YOUR CHALLENGE:**

Efficiently and securely turning the internal diameter and face.

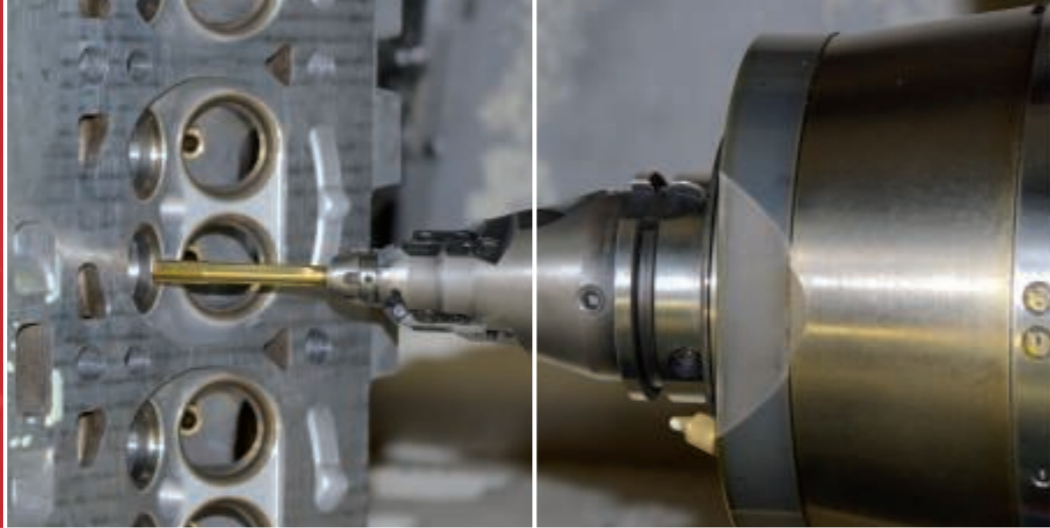
**OUR SOLUTION:**

The flexible Seco-Capto quick change turning head system reduces tool change times and can be error-proof modified for mass production applications. Offering highly rigid and accurate performance, the system also enables full automation of presetting by adding electronic data chips to the toolholders. Additionally, applying ISO/ANSI Duratomic® inserts maximises chip removal rate for this application. Your benefits include reliable accuracy and increased efficiency.

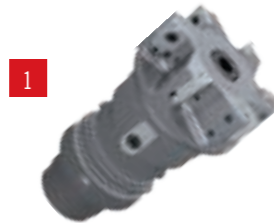
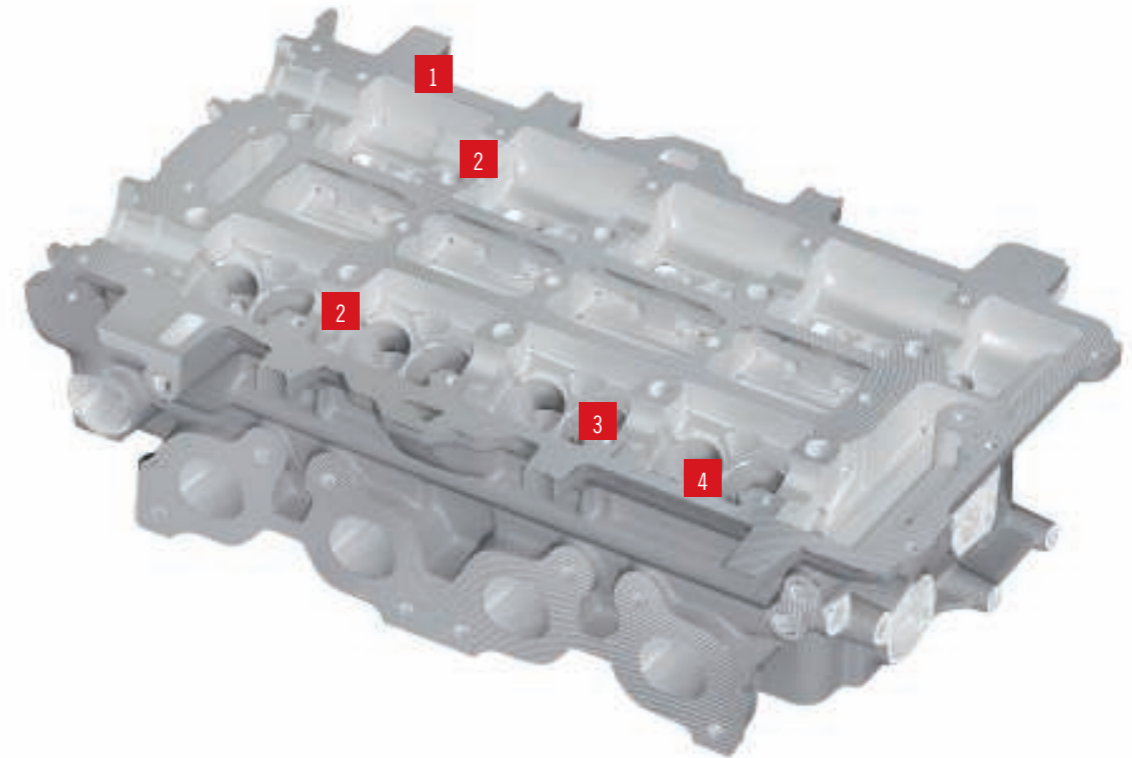


**YOUR MANUFACTURING CHALLENGES:**

- Removing irregular stock with high productivity and reliability
- Maintaining productivity while cutting irregular stock, cast skin and impure surfaces
- Achieving productive and reliable roughing of valve spring seats and tappet bores
- Finishing tappet bores with optimal quality and process security



# MACHINING ENGINE COMPONENTS: CYLINDER HEAD



**R220.91 CUSTOM FACE MILLING CUTTER**

**YOUR CHALLENGE:**

Removing irregular stock with high productivity and reliability.

**OUR SOLUTION:**

Available in diameters ranging from 50 mm to 125 mm, the R220.91 provides top performance in irregular stock, with insert geometries for both roughing and finishing. The steel cutter body is balanced and features through coolant holes, while PCD-tipped inserts maximise metal removal rates and tool life. Your benefits include high accuracy, increased tool life and reduced wear on your machine's spindle bearings.



**CUSTOM PCD BALL NOSE MILLING CUTTER**

**YOUR CHALLENGE:**

Maintaining productivity while cutting irregular stock, cast skin and impure surfaces.

**OUR SOLUTION:**

PCD-tipped to provide long, predictable tool life, the Custom PCD Ball Nose Milling Cutter incorporates through coolant holes to maximise performance. A balanced tool with an integrated HSK shank, the cutter offers retrofitting possibilities and lowers costs by reducing tool consumption and increasing part quality. Your benefits include higher process security and productivity.



**CUSTOM PCD TOOL**

**YOUR CHALLENGE:**

Achieving productive and reliable roughing of valve spring seats and tappet bores.

**OUR SOLUTION:**

To maximise productivity, this custom tool performs drilling, spot facing and boring in a single operation. The highest metal removal rates are achieved with PCD 20 inserts. Your benefits include substantial productivity gains through a highly reliable process.



**CUSTOM PCD REAMER**

**YOUR CHALLENGE:**

Finishing tappet bores with optimal quality and process security.

**OUR SOLUTION:**

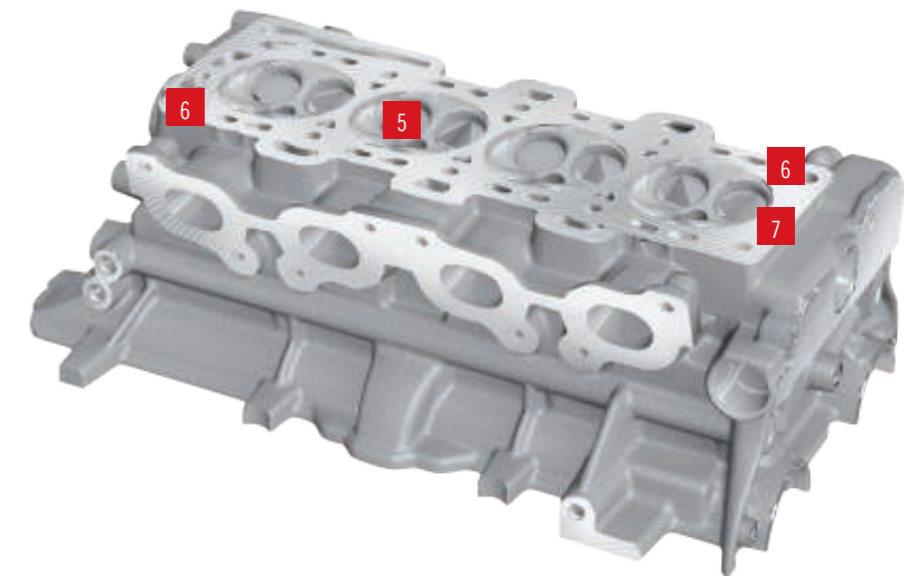
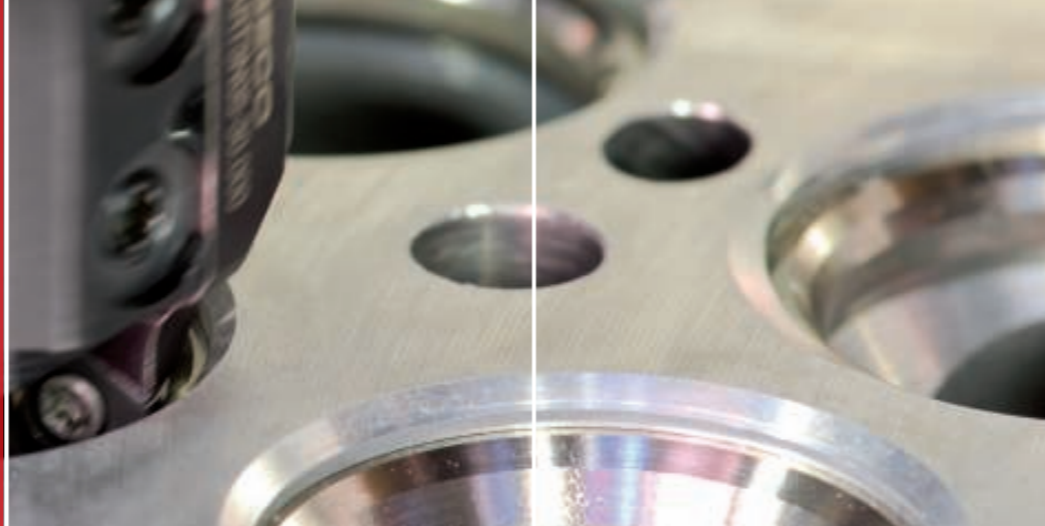
For the finishing of holes requiring close tolerances and stringent bore geometries, this custom tool achieves the needed quality with minimal cycle times. Balanced and featuring through coolant holes, the tool is PCD tipped and can be reground or reconditioned to its original condition to achieve maximum usable tool life. Your benefits include reducing the costs of achieving high-quality output.



#### YOUR MANUFACTURING CHALLENGES:

- Productively roughing swirl chambers and guide entrances for boring
- Reliably performing high-quality finishing of parent metal bores for valve seats and guides
- Meeting quality and productivity requirements when finishing valve seats and guides

- Reducing cycle times and ensuring reliability for numerous holes
- Maintaining high productivity and reliability when finishing parts with demanding surface finish and flatness requirements



# MACHINING ENGINE COMPONENTS: CYLINDER HEAD



**CUSTOM PCD TOOL**

#### YOUR CHALLENGE:

Productively roughing swirl chambers and guide entrances for boring.

#### OUR SOLUTION:

To maximise productivity, this custom tool performs boring and counterboring in a single operation. The highest metal removal rates are achieved with carbide AL geometry or PCD 20 inserts. Your benefits include substantial productivity gains through a highly reliable process.



**CUSTOM PCD REAMER**

#### YOUR CHALLENGE:

Reliably performing high-quality finishing of parent metal bores for valve seats and guides.

#### OUR SOLUTION:

For the finishing of holes requiring close tolerances and stringent bore geometries, this custom tool achieves the needed quality with minimal cycle times. Balanced and featuring through coolant holes, the tool is PCD tipped and can be reground or reconditioned to its original condition to achieve maximum usable tool life. Your benefits include reducing the costs of achieving high-quality output.



**CUSTOM BIFIX® REAMERS**

#### YOUR CHALLENGE:

Meeting quality and productivity requirements when finishing valve seats and guides.

#### OUR SOLUTION:

Fully integrated with an HSK attachment, custom Bifix reamers combine multiple operations. Available as single or multi tooth guide reamers made from carbide or PCD, the cutters incorporate patented adjustable cartridges to provide maximum security. Fullface, 4-edge CBN inserts finish the different chamfers on the sintered steel ring seat, and the tool is balanced to minimise wear on spindle bearings. Your benefits include reducing cost per part while increasing the stability of your operations.



**CUSTOM PCD STEP DRILL**

#### YOUR CHALLENGE:

Reducing cycle times and ensuring reliability for numerous holes.

#### OUR SOLUTION:

Featuring a low friction PCD tip and high strength geometry, this tool provides high process security and offers long, predictable tool life. Sharp cutting edges increase hole quality and reduce exit burrs, and the tool allows the use of aggressive cutting data, making it an ideal method for increasing productivity on high speed machining centres. Your benefits include superb quality and reduced costs from higher throughput.



**R220.91 CUSTOM FACE MILLING CUTTER**

#### YOUR CHALLENGE:

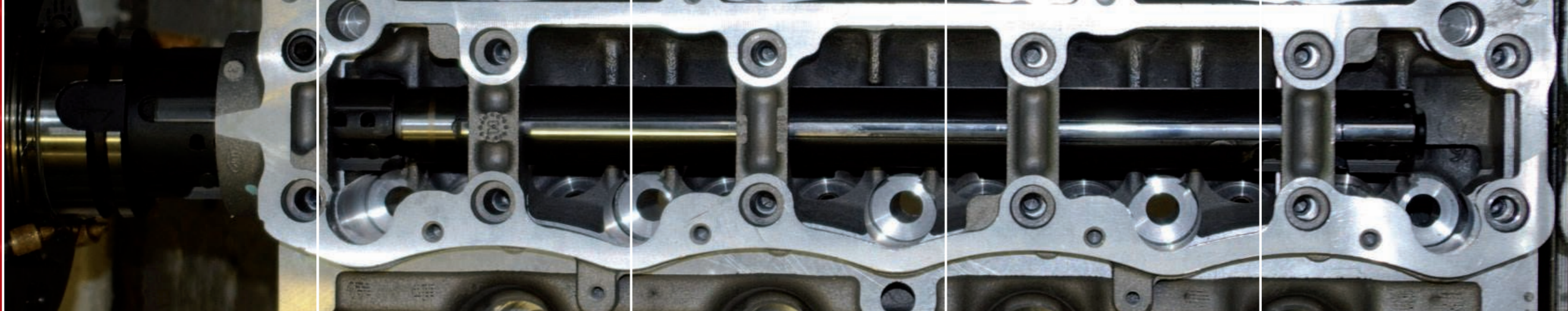
Maintaining high productivity and reliability when finishing parts with demanding surface finish and flatness requirements.

#### OUR SOLUTION:

Available in diameters ranging from 50 mm to 200 mm, the R220.91 provides top performance with insert geometries for finishing. The cutter body is balanced and features through coolant holes, while PCD-tipped inserts maximise metal removal rates and tool life. Your benefits include high accuracy, increased tool life and reduced wear on your machine's spindle bearings.

**YOUR MANUFACTURING CHALLENGES:**

- Drilling numerous holes with low cycle times, high quality and reliability
- Finishing the camshaft line while maintaining quality, productivity and reliability requirements
- Minimising cycle times when producing numerous deep, high-quality holes



# MACHINING ENGINE COMPONENTS: CYLINDER HEAD



**SECO FEEDMAX™ CHAMFER DRILL**

**YOUR CHALLENGE:**

Drilling numerous holes with low cycle times, high quality and reliability.

**OUR SOLUTION:**

Providing high performance when dealing with angled exits or intersecting holes, the Seco Feedmax Chamfer Drill utilises the light-cutting N geometry and a special edge preparation to increase process security and tool life. The tool also incorporates a low-friction coating, and uses four land margins to increase stability. Your benefits include maintaining productivity in challenging, high-tolerance holes.



**CUSTOM BIFIX® REAMER**

**YOUR CHALLENGE:**

Finishing the camshaft line while maintaining quality, productivity and reliability requirements.

**OUR SOLUTION:**

Each of this pair of custom tools uses a single PCD indexable blade and guide pads to maintain impeccable tolerances, roundness, concentricity and surface finish. The shorter tool machines the first bearing on both camshaft lines, with the longer tool then machining all of the bearings on both lines. Through coolant holes maximise chip evacuation. Your benefits include absolute precision in a proven process for this specific application.



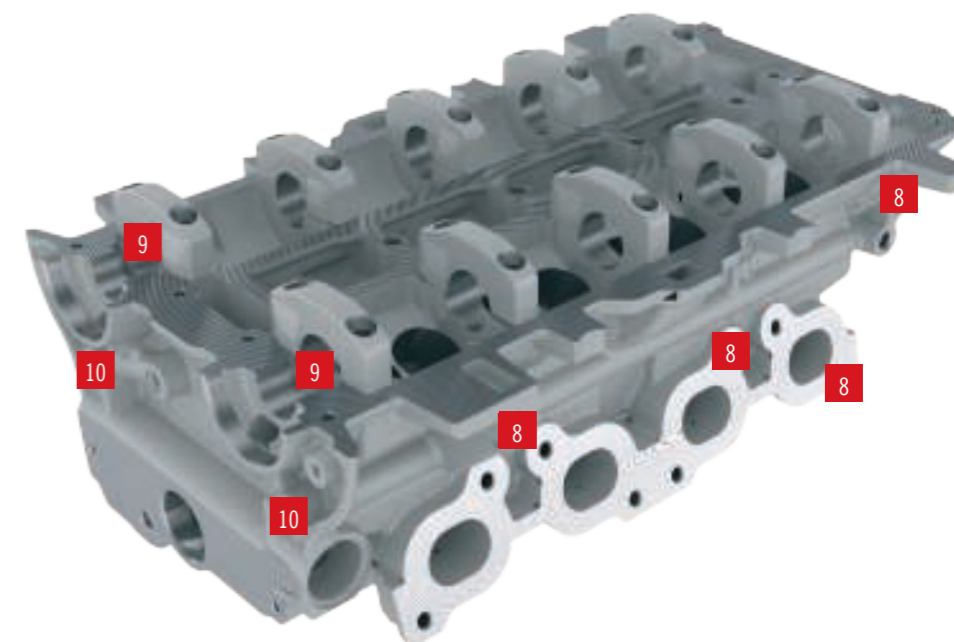
**SECO FEEDMAX™ SD230A**

**YOUR CHALLENGE:**

Minimising cycle times when producing numerous deep, high-quality holes.

**OUR SOLUTION:**

Featuring sharp, positive and strong cutting edges that provide excellent hole quality, Seco Feedmax SD230A provides high performance in drilling holes of up to 30x tool diameter. Optimised geometries ensure process security, long tool life and exceptional performance in aluminium, reducing exit burrs and minimising workpiece deformation. Your benefits include reliable, productive and cost-efficient holemaking.



**YOUR MANUFACTURING CHALLENGES:**

- Drilling numerous holes with low cycle times, high quality and reliability
- Producing spot faces with maximum productivity and reliability
- Productively and reliably producing both chamfers when roughing the crank bore
- Establishing an efficient and secure process for finishing the crank bore



# MACHINING ENGINE COMPONENTS: CONNECTING ROD



**SECO FEEDMAX™ SD245 CHAMFER DRILL**

**YOUR CHALLENGE:**

Drilling numerous holes with low cycle times, high quality and reliability.

**OUR SOLUTION:**

Providing high performance when dealing with angled exits or intersecting holes, the Seco Feedmax SD245 Chamfer Drill utilises the light-cutting geometry and a special edge preparation to increase process security and tool life. The tool also incorporates a low-friction coating, and uses four land margins to increase stability. Your benefits include maintaining productivity in challenging, high-tolerance holes.



**R417.19 CUSTOM SPOT FACE AND CHAMFERING CUTTER**

**YOUR CHALLENGE:**

Producing spot faces with maximum productivity and reliability.

**OUR SOLUTION:**

The R417.19 custom tool uses a square positive insert and adjustable cartridge with a chamfering insert to combine spot facing and chamfering operations. The balanced cutter offers smooth cutting action and produces a constant chamfer value on a multi-spindle machine. Your benefits include cost reduction through process optimisation.



**CUSTOM CHAMFERING AND BORING BAR**

**YOUR CHALLENGE:**

Productively and reliably producing both chamfers when roughing the crank bore.

**OUR SOLUTION:**

This custom tool provides both crank bore roughing and chamfering by circular interpolation, with the ability to adjust the chamfer dimension by setting the insert with a fine adjustment screw. Through coolant holes increase tool life and chip evacuation, and the use of ISO/ANSI Duratomic® inserts maximise metal removal rates. Your benefits include greater process efficiency and reduced costs.



**CUSTOM XFIX™ MULTI-TOOTH REAMER**

**YOUR CHALLENGE:**

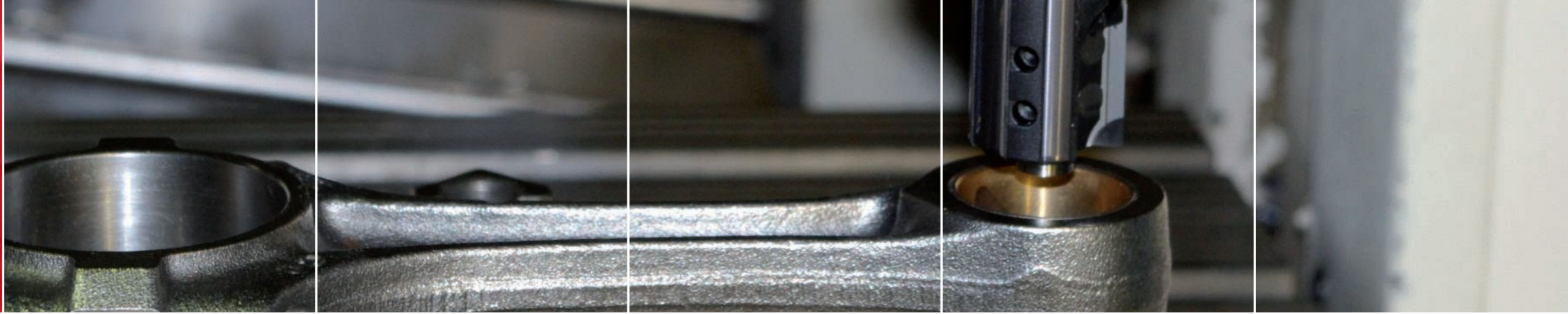
Establishing an efficient and secure process for finishing the crank bore.

**OUR SOLUTION:**

Maintaining high precision output while minimising cycle times, Xfix uses up to nine teeth to provide high feed rates, while holding tolerances as tight as IT6. Strong and stable insert cartridges ensure process security, while preloaded guide pads prevent vibration and increase stability. Your benefits include achieving needed tolerances without sacrificing the productivity of your production line.

**YOUR MANUFACTURING CHALLENGES:**

- Productively and reliably producing both chamfers (V shape) on piston bore
- Drilling the piston bore with minimal cost and time
- Reliably finish cutting the piston bore brass bush with high quality and productivity



# MACHINING ENGINE COMPONENTS: CONNECTING ROD



**CUSTOM PLUNGING AND CHAMFERING CUTTER**

**YOUR CHALLENGE:**

Productively and reliably producing both chamfers (V shape) on piston bore.

**OUR SOLUTION:**

Specially designed for machining the V shape on the piston side of the connecting rod, this cutter combines spot facing and chamfering to increase productivity. The use of insert cartridges protects the cutter body and allows the chamfer value to be easily adjusted by setting the chamfering insert. Your benefits include an economical solution that streamlines your production process.



**CUSTOM PERFORMAX® CHAMFER DRILL**

**YOUR CHALLENGE:**

Drilling the piston bore with minimal cost and time.

**OUR SOLUTION:**

Developed specifically to avoid deflection when starting to drill the large stamping dimple, this custom Perfomax drill features two inserts on the outer diameter to stabilise the tool until the centre insert engages the material. A unique flute design optimises chip removal, and the use of Perfomax drilling inserts allows for a very cost-effective process. Your benefits include reducing costs while maintaining high process stability.



**CUSTOM BIFIX® PCD REAMER**

**YOUR CHALLENGE:**

Reliably finish cutting the piston bore brass bush with high quality and productivity.

**OUR SOLUTION:**

To allow for high cutting speeds while maintaining accuracy, the Bifix PCD reamer uses a PCD reaming blade and multiple guide pads to maintain stability. The PCD-tipped blade provides long tool life and excellent surface finishes. Your benefits include highly productive precision machining with lower production costs.



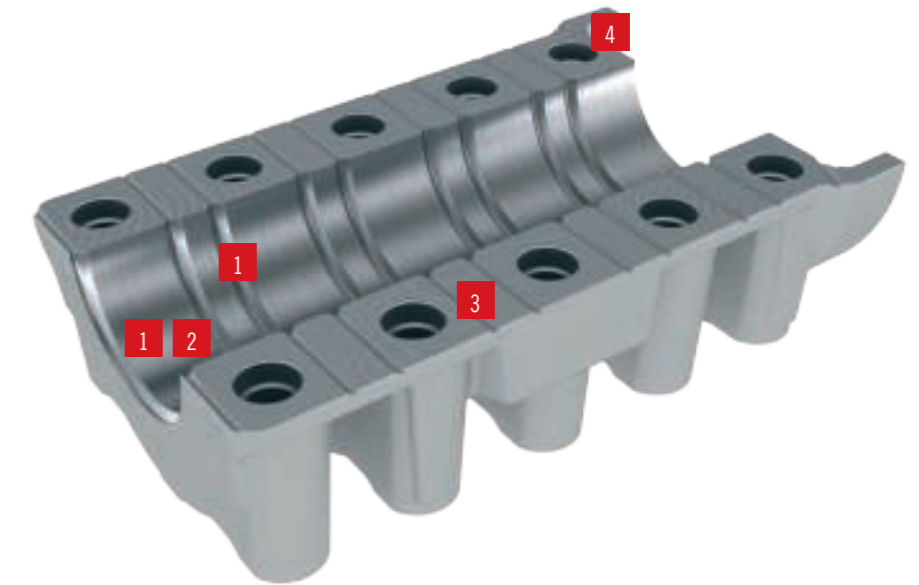
#### YOUR MANUFACTURING CHALLENGES:

- Creating an efficient and secure process for chamfering bearings before splitting
- Reliably roughing crank bores with minimum cycle time
- Maintaining productivity and reliability while face milling irregular stock, cast skin and impure surfaces

- Meeting surface finish and flatness requirements while productively finishing main faces
- Maximising productivity by combining seal location and chamfer into one operation



# MACHINING ENGINE COMPONENTS: BEARING CAP



**1** CUSTOM CHAMFER MILLING CUTTER

#### YOUR CHALLENGE:

Creating an efficient and secure process for chamfering bearings before splitting.

#### OUR SOLUTION:

To optimise productivity, this custom tool was designed to allow all chamfers on the bearing cap to be machined in a single pass. A guide bushing supports the front end of the cutter body during the contouring operation to ensure reliable performance. Your benefits include minimising cycle times with an economical solution.



**2** CUSTOM PLUNGE MILLING CUTTER

#### YOUR CHALLENGE:

Reliably roughing crank bores with minimum cycle time.

#### OUR SOLUTION:

This custom tool contains an optimum number of teeth for roughing a crank bore by plunging and secures inserts via a centre-lock clamping system. The tool's positive geometry reduces cutting forces and minimises machine power requirements, while through coolant holes improve tool life. Your benefits include increasing productivity and reducing costs.



**3** DOUBLE OCTOMILL™ FACE MILLING CUTTER

#### YOUR CHALLENGE:

Maintaining productivity and reliability while face milling irregular stock, cast skin and impure surfaces.

#### OUR SOLUTION:

With sixteen cutting edges per indexable insert, Double Octomill significantly reduces the cost of obtaining high quality results. The tool provides surface finishes with maximum security, achieves tremendous cutter body life and can be used for both roughing and finishing. Your benefits include cost reduction while maintaining top performance.



**3** QUATTROMILL® FACE MILLING CUTTER

#### YOUR CHALLENGE:

Meeting surface finish and flatness requirements while productively finishing main faces.

#### OUR SOLUTION:

A super positive geometry with up to a 35-degree effective rake angle makes Quattromill an ideal choice for challenging face milling applications. A robust cutter body with a protective coating houses strong inserts with integrated anvils that protect the pocket seats. Your benefits include maintaining impeccable surface finishes while increasing the productivity and flexibility of your milling operations.



**4** CUSTOM MILLING CUTTER

#### YOUR CHALLENGE:

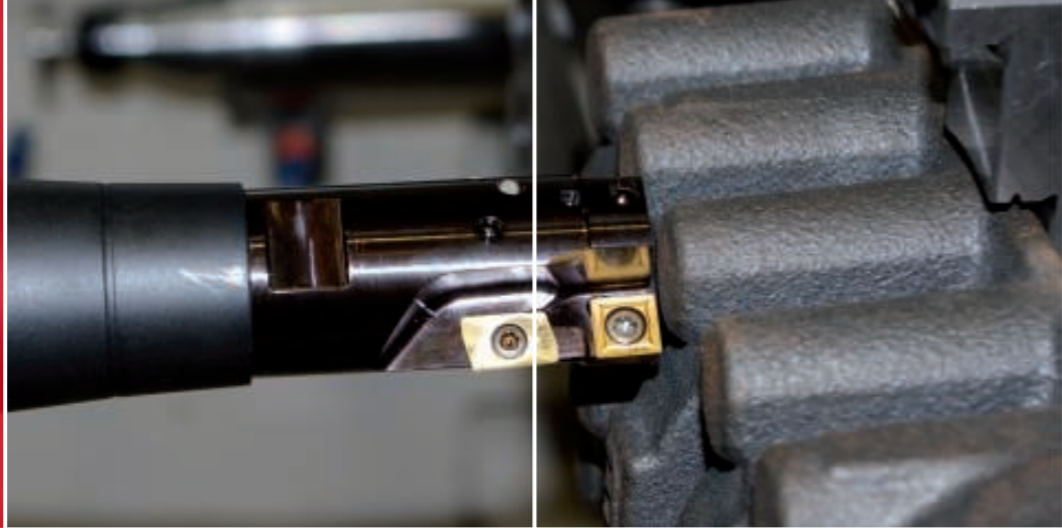
Maximising productivity by combining seal location and chamfer into one operation.

#### OUR SOLUTION:

Combining contouring and chamfering operations, this custom step milling cutter uses a positive geometry to minimise cutting forces and reduce machine power requirements. The balanced tool includes through coolant holes to increase tool life. Your benefits include increased efficiency by combining cutting applications.

**YOUR MANUFACTURING CHALLENGES:**

- Reducing cycle times for roughing the outer diameter
- Producing spot faces with maximum productivity and reliability
- Drilling numerous holes with low cycle times, high quality and reliability
- Minimising setting and adjusting time in bearing splitting operations



# MACHINING ENGINE COMPONENTS: BEARING CAP



**CUSTOM OD MACHINING TOOL**

**YOUR CHALLENGE:**

Reducing cycle times for roughing the outer diameter.

**OUR SOLUTION:**

This custom tool features an integrated HSK-A attachment to reduce weight and overhang, enabling it to be used with a high feed. Positive geometry minimises cutting forces and demands on the machine, and use of ISO/ANSI Duratomic® TK2001 inserts will maximise metal removal rates. Your benefits include boosting productivity and attaining optimal performance from your equipment.



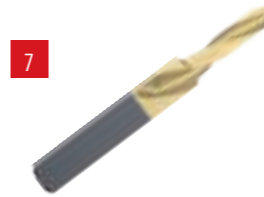
**R417.19 CUSTOM SPOT FACE MILLING CUTTER**

**YOUR CHALLENGE:**

Producing spot faces with maximum productivity and reliability.

**OUR SOLUTION:**

Using a square positive insert with a dedicated geometry for low cutting speeds, this custom tool provides an optimal method for milling spot faces of the fastening holes. The balanced custom cutter offers smooth cutting action and features a centre-lock insert clamping system to ensure stability. Your benefits include a cost-effective solution that reduces wear on spindle bearings.



**SECO FEEDMAX™ CHAMFER DRILL**

**YOUR CHALLENGE:**

Drilling numerous holes with low cycle times, high quality and reliability.

**OUR SOLUTION:**

Providing high performance when dealing with angled exits or intersecting holes, the Seco Feedmax Chamfer Drill utilises the light-cutting geometry and a special edge preparation to increase process security and tool life. The tool also incorporates a low-friction coating, and uses four land margins to increase stability. Your benefits include maintaining productivity in challenging, high-tolerance holes.



**GANG DISC MILLING CUTTER**

**YOUR CHALLENGE:**

Minimising setting and adjusting time in bearing splitting operations.

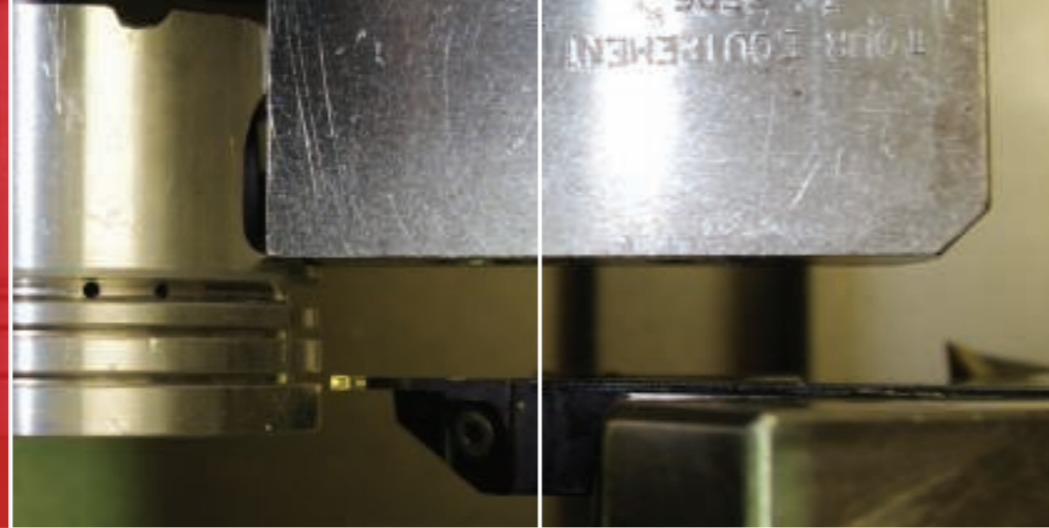
**OUR SOLUTION:**

Created specifically for the splitting operation, the Gang Disc Milling Cutter uses fixed pockets and positive insert geometries to reduce cutting forces and minimise machine power requirements. The high number of teeth and incorporation of HX grade precision ground carbide inserts provide optimal performance in cast iron. Your benefits include a fast, economical solution for your splitting application.

#### YOUR MANUFACTURING CHALLENGES:

- Reducing cycle times for grooving applications
- Achieving reliable and efficient production when roughing the piston axis bore
- Finishing the piston axis bore while maintaining quality, productivity and reliability requirements

- Copying the face with maximum productivity and reliability
- Ensuring high productivity during turning of the outer diameter and face



# MACHINING ENGINE COMPONENTS: PISTON



**SECO-CAPTO™ MDT GROOVING TOOL**

#### YOUR CHALLENGE:

Reducing cycle times for grooving applications.

#### OUR SOLUTION:

With a top clamp and serrated contact surfaces between the insert and tool holder, Secoloc insert clamping provides the MDT system with superb stability, which is then further enhanced through the use of long inserts. The Seco-Capto interface adds tremendous flexibility, and the ability to move to full automation by adding electronic data chips to the toolholders. PCD grooving inserts provide the highest metal removal rates for this application. Your benefits include robust performance, high process security and shorter cycle times.



**CUSTOM BORING TOOL**

#### YOUR CHALLENGE:

Achieving reliable and efficient production when roughing the piston axis bore.

#### OUR SOLUTION:

Tailored for semi-finishing of piston axis bores, this custom tool incorporates ISO/ANSI positive PCD inserts for maximum material removal rates. Through coolant holes and polished chip flutes offer optimal chip evacuation and optimise tool life. Your benefits include long, reliable tool life and a productive application.



**CUSTOM BIFIX® PCD REAMER**

#### YOUR CHALLENGE:

Finishing the piston axis bore while maintaining quality, productivity and reliability requirements.

#### OUR SOLUTION:

To allow for high cutting speeds while maintaining accuracy, the Bifix PCD reamer uses a PCD reaming blade and multiple guide pads to maintain stability. The PCD-tipped blade provides long tool life and excellent surface finishes. Your benefits include highly productive precision machining with lower production costs.



**CUSTOM SECO-CAPTO™ TURNING TOOL | SECO-CAPTO™ TURNING TOOL**

#### YOUR CHALLENGE:

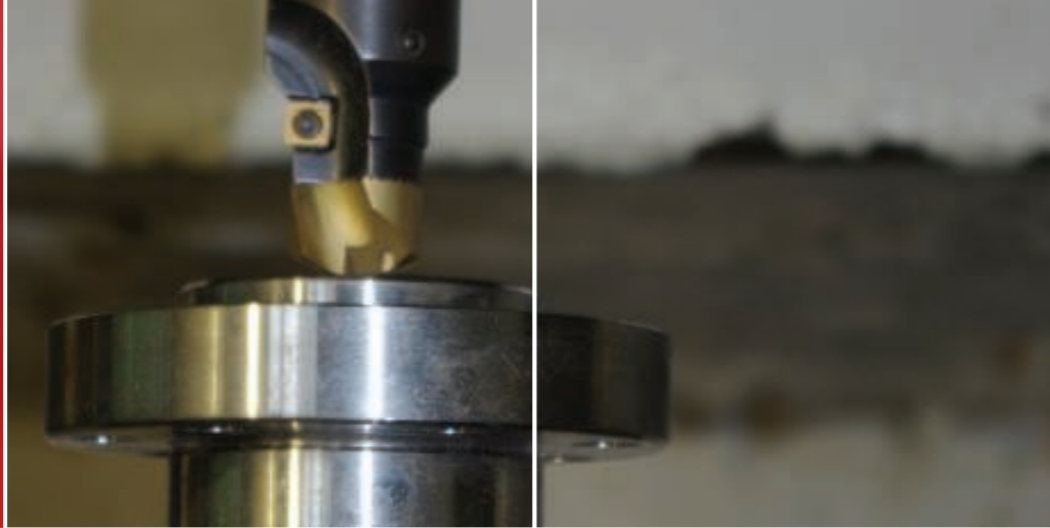
Copying the face with maximum productivity and reliability. | Ensuring high productivity during turning of the outer diameter and face.

#### OUR SOLUTION:

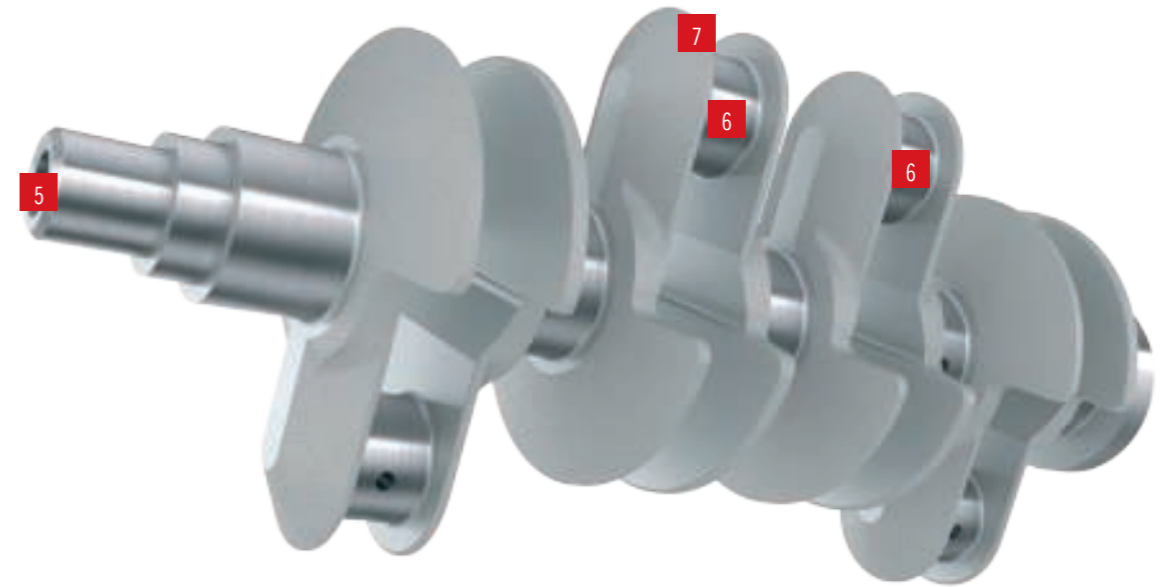
The flexible Seco-Capto quick change turning head system reduces tool change times and can be error-proof modified for mass production applications. Offering highly rigid and accurate performance, the system also enables full automation of presetting by adding electronic data chips to the tool holders. Additionally, using ISO/ANSI PCD 20 inserts maximises chip removal rate for this application. Your benefits include reliable accuracy and increased efficiency.

**YOUR MANUFACTURING CHALLENGES:**

- Cost effectively drilling numerous holes requiring a chamfer
- Producing numerous holes with minimal tool cost per piece
- Reaming precise holes with perfect surface finishes
- Drilling numerous holes with low cycle times, high quality and reliability
- Machining irregular stock, cast skin and impure surfaces efficiently and reliably



# MACHINING ENGINE COMPONENTS: CRANKSHAFT



**CUSTOM CROWNLOC® SPOT FACE AND CHAMFER DRILL**

**YOUR CHALLENGE:**

Cost effectively drilling numerous holes requiring a chamfer.

**OUR SOLUTION:**

This custom tool incorporates turning inserts with a Crownloc drill to combine drilling and chamfering into a single operation. Crownloc drills use exchangeable heads with a strong locking system to avoid deflection and provide high chip removal rates. This approach eliminates regrinding costs and increases flexibility by allowing appropriate drill geometries to quickly and easily be applied to different applications. Your benefits include reducing tool inventory and increasing production efficiency.



**CROWNLOC® DRILL**

**YOUR CHALLENGE:**

Producing numerous holes with minimal tool cost per piece.

**OUR SOLUTION:**

Crownloc drills use exchangeable heads with a strong locking system to avoid deflection and provide high chip removal rates. This approach eliminates regrinding costs and increases flexibility by allowing appropriate drill geometries to quickly and easily be applied to different applications. Your benefits include reducing tool inventory and increasing production efficiency.



**SECO REAMING SOLUTIONS**

**YOUR CHALLENGE:**

Reaming precise holes with perfect surface finishes.

**OUR SOLUTION:**

An interchangeable head reamer, Precimaster™ minimises cost per hole while providing excellent results. Additionally, our Nanofix™, Precifix™ and Xfix™ lines fill out our range of reaming products, guaranteeing a productive and high quality solution for holes ranging from 2.97 mm to 155 mm in diameter. Your benefits include reducing costs while maintaining exacting tolerances and surface finish requirements.



**SECO FEEDMAX™ CHAMFER DRILL**

**YOUR CHALLENGE:**

Drilling numerous holes with low cycle times, high quality and reliability.

**OUR SOLUTION:**

Providing high performance when dealing with angled exits or intersecting holes, the Seco Feedmax Chamfer Drill utilises the light-cutting geometry and a special edge preparation to increase process security and tool life. The tool also incorporates a low-friction coating, and uses four land margins to increase stability. Your benefits include maintaining productivity in challenging, high-tolerance holes.



**CUSTOM PIN MILLING CUTTER**

**YOUR CHALLENGE:**

Machining irregular stock, cast skin and impure surfaces efficiently and reliably.

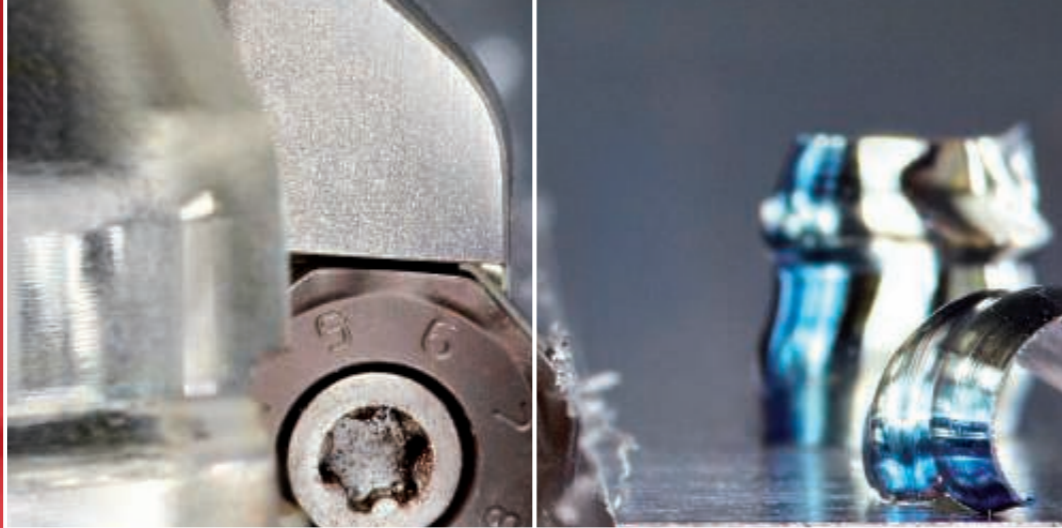
**OUR SOLUTION:**

This unique cutter offers a profile that mills the bearing surface and two under cuts, and can be adjusted to suit various profiles for differing crankshaft designs. Thick inserts achieve reliable performance with high feed rates, and the tool provides excellent chip evacuation and material removal rates. Your benefits include dramatic reductions to cycle time with a highly secure and safe process.

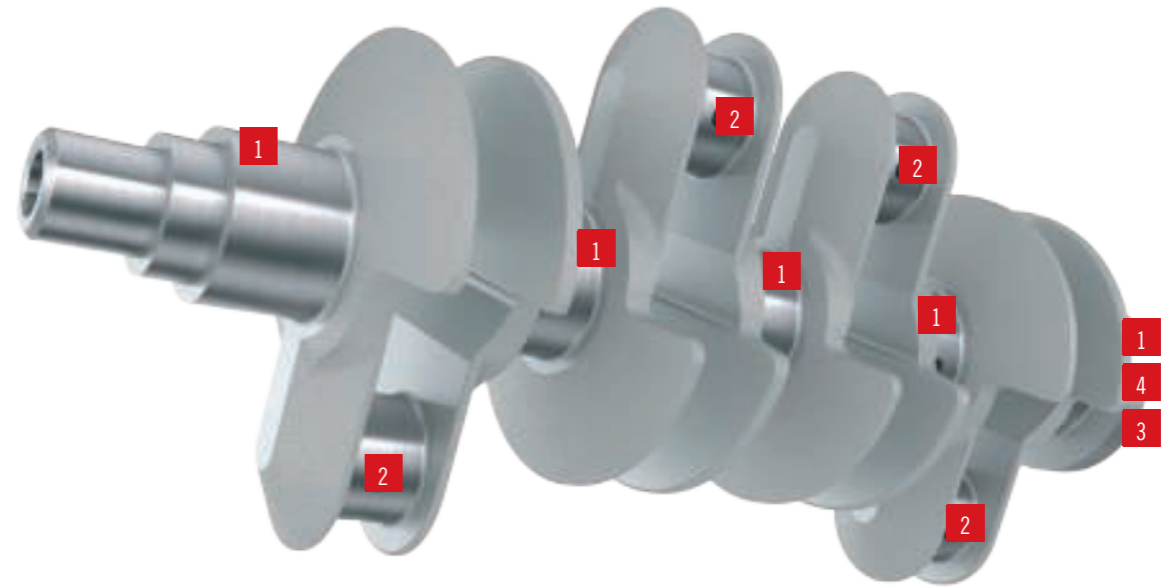


**YOUR MANUFACTURING CHALLENGES:**

- Efficiently turning and broaching irregular stock, interrupted cuts and impure surfaces
- Productively machining the pins despite irregular stock and impure surfaces
- Cost effectively drilling numerous holes requiring a chamfer
- Maintaining productivity and reliability while face milling irregular stock, cast skin and impure surfaces



# MACHINING ENGINE COMPONENTS: CRANKSHAFT



**1** CUSTOM TURN BROACHING DISC

**YOUR CHALLENGE:**

Efficiently turning and broaching irregular stock, interrupted cuts and impure surfaces.

**OUR SOLUTION:**

By incorporating various turning cartridges, the custom turn broaching disc can perform a variety of turning and grooving operations, from roughing with interruptions to finishing. Using standard, thick inserts in cartridges protected by carbide anvils, the tool offers high process stability and exceptional reliability. Your benefits include a cost-effective, flexible solution with limited machine tool investment.



**2** CUSTOM INTERNAL MILLING CUTTER

**YOUR CHALLENGE:**

Productively machining the pins despite irregular stock and impure surfaces.

**OUR SOLUTION:**

Offering a safe and reliable process for machining the pin, this cutter provides a long cutting arc that makes contact with the workpiece materials to optimise performance. The custom tool's profile can be suited to various bearing profiles for different crankshaft designs and maintains tight tolerances in hardened steel. Use of thick Duratomic® inserts allows high feed rates to be reliably applied. Your benefits include a stable process for a challenging application.



**3** CUSTOM PERFORMAX® CHAMFER DRILL

**YOUR CHALLENGE:**

Cost effectively drilling numerous holes requiring a chamfer.

**OUR SOLUTION:**

By offering the ability to chamfer a hole by plunging after drilling, the custom Perfomax Chamfer Drill combines operations to increase productivity. A unique flute design optimises chip removal, and the use of Perfomax drilling inserts allows for a very cost-effective process. Your benefits include reducing costs while maintaining high process stability.



**4** DOUBLE OCTOMILL™ FACE MILLING CUTTER

**YOUR CHALLENGE:**

Maintaining productivity and reliability while face milling irregular stock, cast skin and impure surfaces.

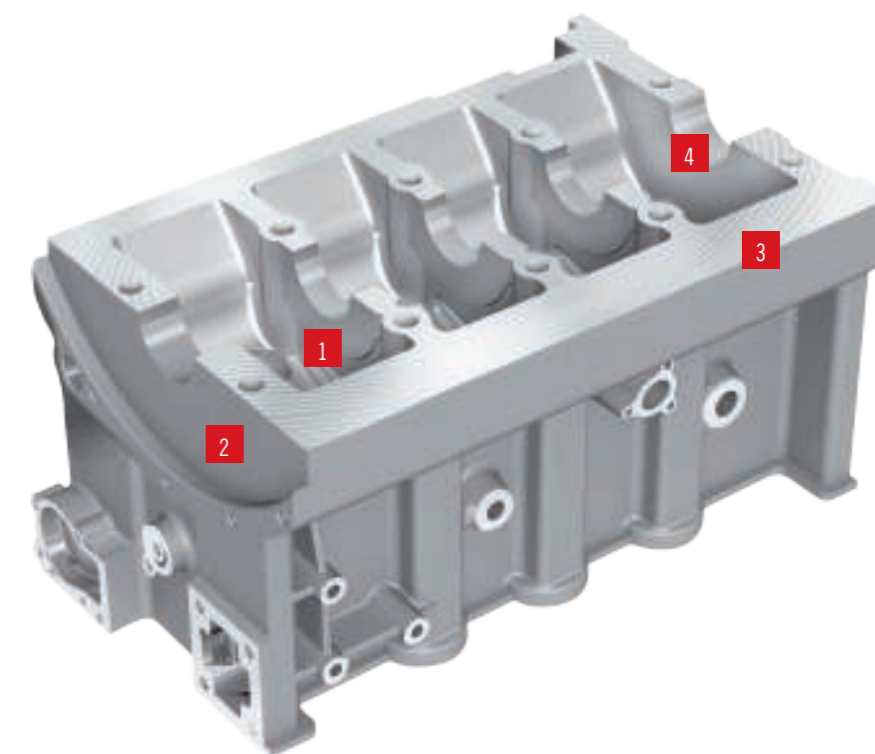
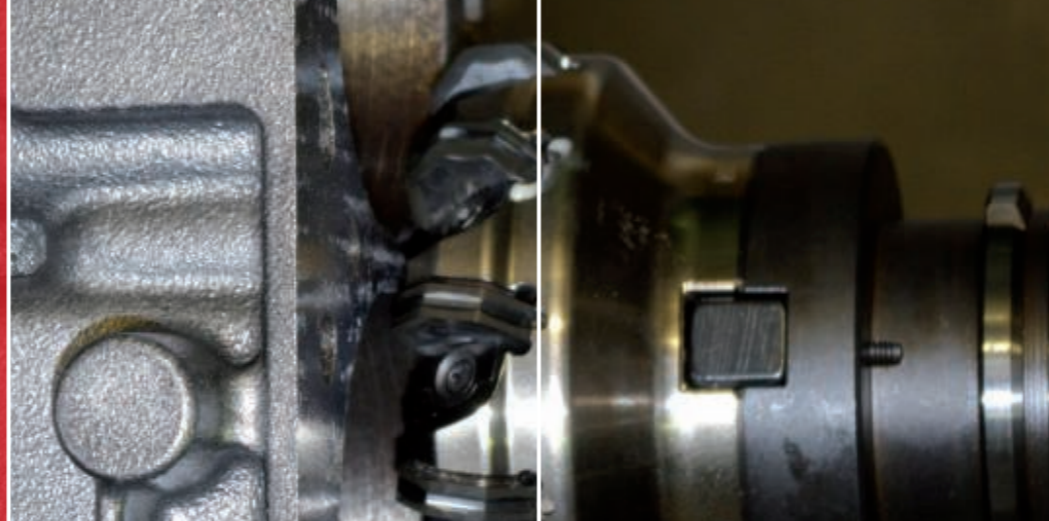
**OUR SOLUTION:**

With sixteen cutting edges per indexable insert, Double Octomill significantly reduces the cost of obtaining high quality results. The tool provides superb surface finishes with maximum security, achieves tremendous cutter body life and can be used for both roughing and finishing. Your benefits include cost reduction while maintaining top performance.

#### YOUR MANUFACTURING CHALLENGES:

- Eliminating vibration while productively milling both thrust faces
- Maintaining productivity and reliability while square shoulder milling irregular stock, cast skin and impure surfaces

- Maintaining productivity and reliability while face milling irregular stock, cast skin and impure surfaces
- Achieving a secure and efficient process for roughing the crank bore line



# MACHINING ENGINE COMPONENTS: CYLINDER BLOCK



**R335.18 DISC MILLING CUTTER ON STEADYLINE™ ARBOR**

#### YOUR CHALLENGE:

Eliminating vibration while productively milling both thrust faces.

#### OUR SOLUTION:

Seco's family of R335 disc milling cutters contain robust bodies for high tool life and incorporate a variety of features designed to optimise machining of cast iron. Positive rake angles reduce cutting forces and vibration to optimise accuracy and energy consumption, and the use of a constant rake angle over the radius maximises chip evacuation. Additionally, the use of Steadyline vibration damping shell mill holders increases dynamic rigidity and allows R335 cutters to be applied with long overhangs. Your benefits include highly productive performance with extended tool life.



**R220.88 SQUARE SHOULDER MILLING CUTTER**

#### YOUR CHALLENGE:

Maintaining productivity and reliability while square shoulder milling irregular stock, cast skin and impure surfaces.

#### OUR SOLUTION:

With a robust cutter body and thick, double-sided square insert, the family of R220.88 cutters provides aggressive material removal in cast iron roughing applications. This close pitch option was developed specifically for automotive components requiring productive milling of small surfaces. Your benefits include top performance and high productivity.



**DOUBLE OCTOMILL™ FACE MILLING CUTTER**

#### YOUR CHALLENGE:

Maintaining productivity and reliability while face milling irregular stock, cast skin and impure surfaces.

#### OUR SOLUTION:

With sixteen cutting edges per indexable insert, Double Octomill significantly reduces the cost of obtaining high quality results. The tool provides superb surface finishes with maximum security, achieves tremendous cutter body life and can be used for both roughing and finishing. Your benefits include cost reduction while maintaining top performance.



**CUSTOM BALL NOSE CUTTER**

#### YOUR CHALLENGE:

Achieving a secure and efficient process for roughing the crank bore line.

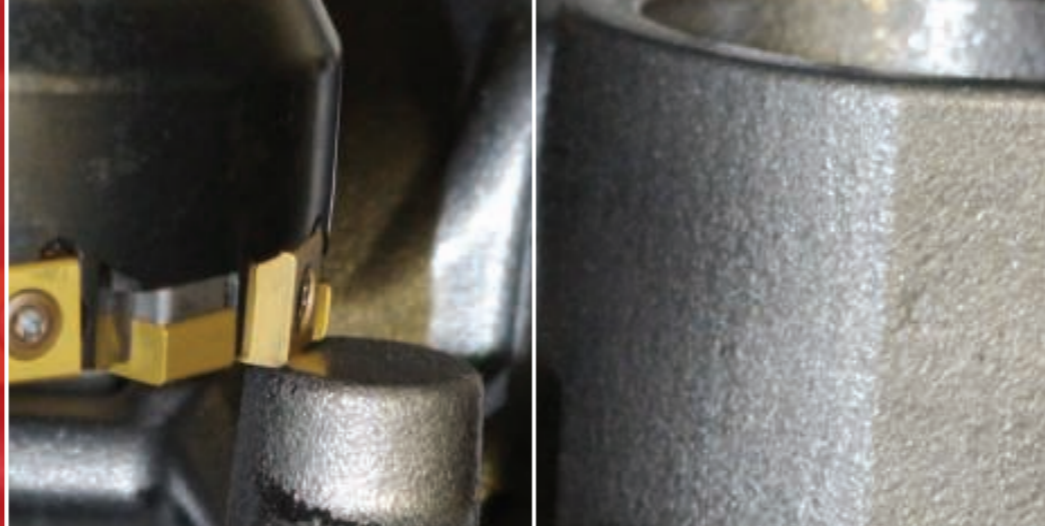
#### OUR SOLUTION:

Designed with strong tangential radius inserts, this custom tool offers extremely high rigidity for roughing the crank bore line. The centre-lock insert clamping system ensures process stability while through coolant holes extend tool life and optimise chip evacuation. Your benefits include achieving constant stock removal on the finishing cut and improving tool life.

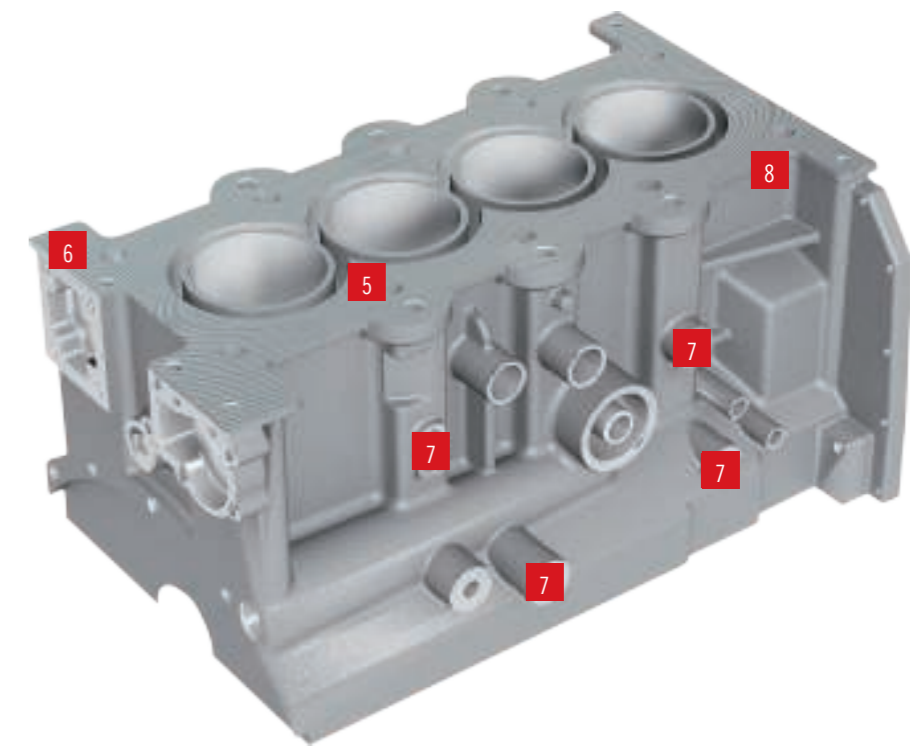
**YOUR MANUFACTURING CHALLENGES:**

- Meeting high table feed and low cutting forces when roughing the cylinder bore
- Meeting stringent tolerance and surface finish specifications when reaming
- Establishing a productive process for milling small areas with irregular stock, cast skin and impure surfaces

- Productively finishing main faces with high surface finish, flatness and waviness requirements



# MACHINING ENGINE COMPONENTS: CYLINDER BLOCK



**5**  
**CUSTOM BORING BAR WITH CBN INSERT**

**YOUR CHALLENGE:**

Meeting high table feed and low cutting forces when roughing the cylinder bore.

**OUR SOLUTION:**

This custom boring bar uses insert cartridges designed specifically to protect the tool body and allow fine adjustment to the positioning of CBN inserts, making it ideal for roughing operations. CBN 300 inserts with an E edge preparation should be used to reduce cutting forces. Your benefits include reliable machining when roughing cylinder bores.



**6**  
**NANOFIX® REAMER**

**YOUR CHALLENGE:**

Meeting stringent tolerance and surface finish specifications when reaming.

**OUR SOLUTION:**

For holes from 2.97 mm to 12 mm in diameter, Nanofix provides an ideal solution for achieving maximum precision. A multi-tooth solid carbide reamer with through coolant holes, Nanofix incorporates Quick-Fit tool changing, which eliminates the need to recheck overall length when replacing a reamer. Your benefits include easily obtaining high levels of precision in hole reaming.



**7**  
**CUSTOM R220.38 SUPER CLOSE PITCH CUTTER**

**YOUR CHALLENGE:**

Establishing a productive process for milling small areas with irregular stock, cast skin and impure surfaces.

**OUR SOLUTION:**

Specially designed for automotive applications requiring milling of small cast iron surfaces, the R220.38 super close pitch cutter reduces milling shocks. The tool offers a robust body and achieves maximum chip removal rates when used with tangential inserts. Your benefits include the ability to increase productivity by using more aggressive cutting data.



**8**  
**R220.30 FACE MILLING CUTTER**

**YOUR CHALLENGE:**

Productively finishing main faces with high surface finish, flatness and waviness requirements.

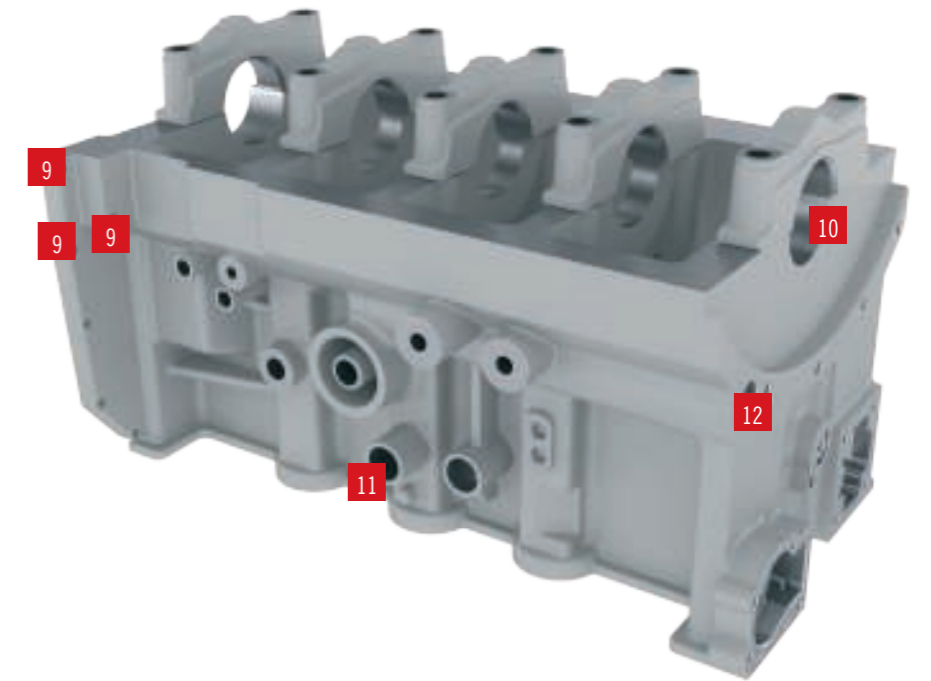
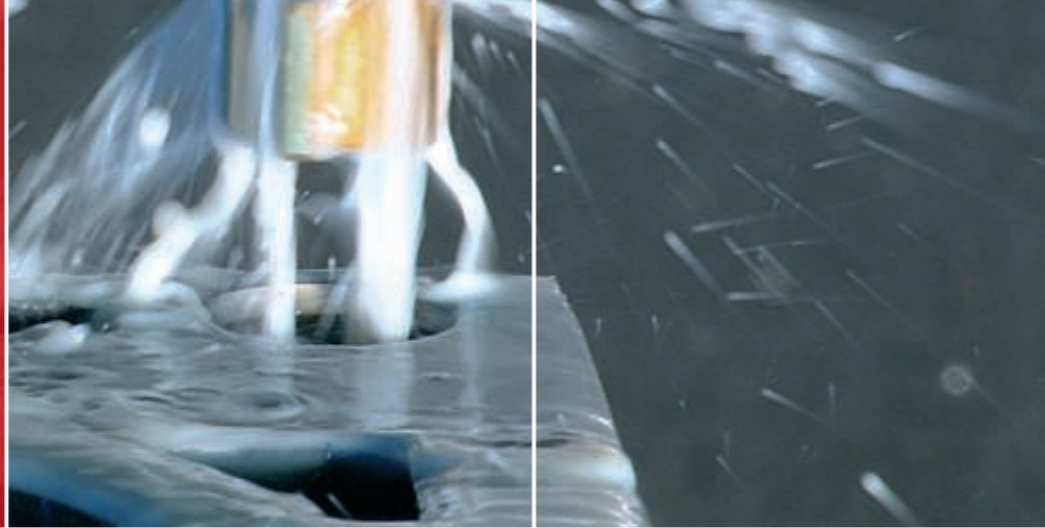
**OUR SOLUTION:**

Available in diameters ranging from 80 mm to 355 mm, the R220.30 offers superb finishing performance. Using a positive insert with four wiper cutting edges, the tool makes it easy to meet flatness and roughness requirements. MH1000 carbide grade inserts optimise performance for finishing operations in cylinder block face milling. Your benefits include an economical and easy-to-use tool for meeting your quality needs.

**YOUR MANUFACTURING CHALLENGES:**

- Drilling numerous holes with low cycle times, high quality and reliability
- Achieving productivity and reliability when finishing the crank bore line
- Reaming precise locating holes with perfect surface finishes

- Minimising tool cost per piece when productively drilling numerous holes
- Minimising cycle times when producing deep, high-quality holes



# MACHINING ENGINE COMPONENTS: CYLINDER BLOCK



**SECO FEEDMAX™ CHAMFER DRILL**

**YOUR CHALLENGE:**

Drilling numerous holes with low cycle times, high quality and reliability.

**OUR SOLUTION:**

Providing high performance when dealing with angled exits or intersecting holes, the Seco Feedmax Chamfer Drill utilises the light-cutting geometry and a special edge preparation to increase process security and tool life. The tool also incorporates a low-friction coating, and uses four land margins to increase stability. Your benefits include maintaining productivity in challenging, high-tolerance holes.



**CUSTOM BORING TOOL WITH ROTARY BUSHING**

**YOUR CHALLENGE:**

Achieving productivity and reliability when finishing the crank bore line.

**OUR SOLUTION:**

After a short fine boring head creates a pilot hole in the first two bearings, this custom boring tool features an anti-friction rotary guide bush to achieve vibration free finishing of the crank bore line. The rotary guide bush can handle any radial or axial load that may be generated and provides excellent precision and reliability. Your benefit includes highly effective and efficient finish boring in a challenging application.



**SECO REAMING SOLUTIONS**

**YOUR CHALLENGE:**

Reaming precise locating holes with perfect surface finishes.

**OUR SOLUTION:**

An interchangeable head reamer, Precimaster™ minimises cost per hole while providing excellent results. Additionally, our Nanofix™, Precifix™ and Xfix™ lines fill out our range of reaming products, guaranteeing a productive and high quality solution for holes ranging from 2.97 mm to 155 mm in diameter. Your benefits include reducing costs while maintaining exacting tolerances and surface finish requirements.



**PERFOMAX® DRILL**

**YOUR CHALLENGE:**

Minimising tool cost per piece when productively drilling numerous holes.

**OUR SOLUTION:**

With strong indexable inserts and a highly stable, low-friction coated drill body, Perfomax achieves excellent productivity and economic performance. The drills feature optimised geometries to eliminate deflection and provide high chip evacuation. Your benefits include increasing throughput and minimising tool cost per part.



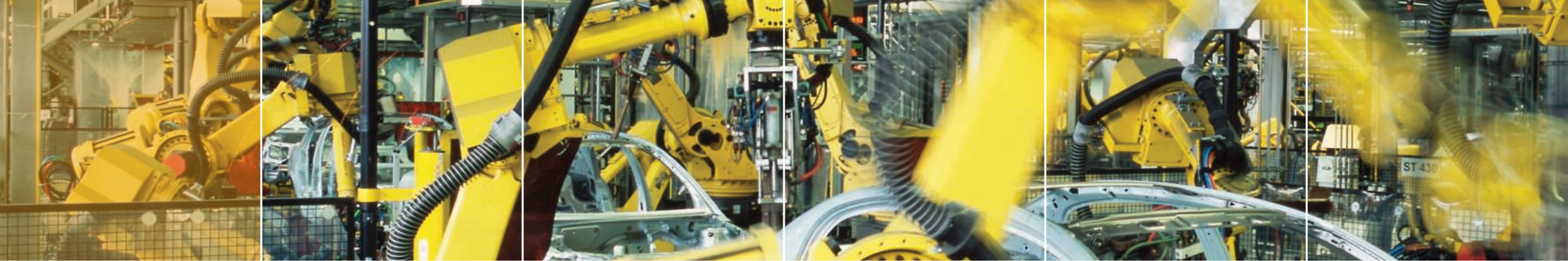
**SECO FEEDMAX™ SD230A**

**YOUR CHALLENGE:**

Minimising cycle times when producing deep, high-quality holes.

**OUR SOLUTION:**

Featuring sharp, positive and strong cutting edges that provide excellent hole quality, Seco Feedmax SD230A provides high performance in drilling holes of up to 30x tool diameter. Optimised geometries ensure process security, long tool life and exceptional performance in aluminium, reducing exit burrs and minimising workpiece deformation. Your benefits include reliable, productive and cost-efficient holemaking.



# 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.

## TURBOCHARGER – R220.29 COPY MILLING CUTTER

Material: Heat resistant stainless steel (SMG 11)  
 Coolant: Water soluble oil  
 Operation: Rough face milling  
 Criterion: Avoid notch wear on cutting edge  
 Fixturing: Hydraulic clamping chuck  
 Tool: Copy milling cutter R219.29-1642.RE-06.5A  
 Insert 1: RPHT1204MOT-M15, MS2500

Cutting data	Metric	$v_c$	$f_z$	$a_p$	$z$	$k$
		210 m/min	0.30 mm/tooth	2.5 mm	5	5
Inch	690 sf/min	0.012"/tooth	0.098"	5	5	

**Results** Tool life = 40 pcs.  
 Round insert and grade MS2500 has improved tool life by 30%.



## TURBOCHARGER – SECO-CAPTO™ TURNING TOOL

Material: Heat resistant stainless steel (SMG 11)  
 Coolant: Water soluble oil  
 Operation: OD turning & facing  $\varnothing$  77 with interruptions  
 Criterion: Tool life  
 Fixturing: Hydraulic clamping chuck  
 Tool: Custom Seco-Capto C5-PWLNL35060-08  
 Insert 1: WNMG080412-M5, TP1500

Cutting data	Metric	$v_c$	$f_z$	$a_p$	$z$
		120 m/min	0.25 to 0.40 mm/rev	3 mm	1
Inch	395 sf/min	0.012 to 0.016"/rev	0.118"	1	

**Results** Tool life = 30 pcs.  
 30% increase to tool life via Duratomic® insert grade TP1500.

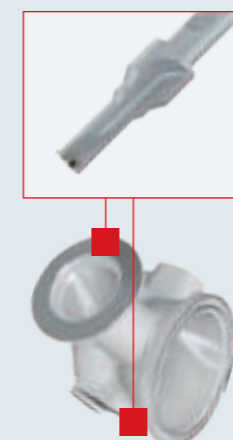


## TURBOCHARGER – PERFOMAX® DRILL

Material: Heat resistant stainless steel (SMG 11)  
 Coolant: Water soluble oil  
 Operation: Drilling valve axis and chamfering  
 Fixturing: Hydraulic clamping fixture  
 Tool: Custom Perfomax chamfer drill  $\varnothing$  16.8  
 Insert 1: SCGX050204-P2, T2000D  
 Insert 2: SPGX0502-C1, T400D

Cutting data	Metric	$v_c$	$f_z$	$z$	$k$
		120 m/min	0.06 mm/rev	1	1
Inch	395 sf/min	0.0024"/rev	1	1	

**Results** Tool life = 40 pcs.  
 Achieved better chip flow, while reducing cutting forces.

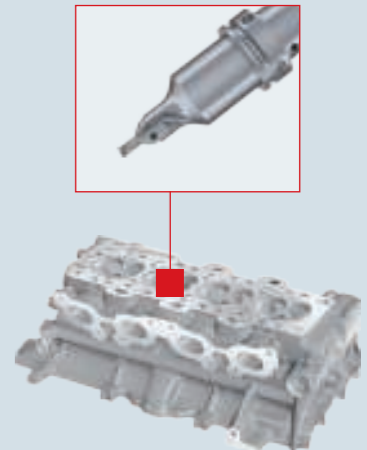


## CYLINDER HEAD – CUSTOM PCD TOOL

Material: Aluminium (SMG 16)  
 Coolant: Water soluble oil  
 Operation: Valve seat and whirling chamber roughing  
 Criterion: Tool life  
 Fixturing: Hydraulic clamping fixture  
 Tool: Custom tool for valve seat roughing  
 Insert 1: CCGT060204F-AL, KX  
 Insert 2: Custom CW insert

Cutting data	Metric	$v_c$	$f_z$	$a_p$	$z$
		1000 m/min	0.15 mm/rev	2.5 to 3 mm	1
Inch	3280 sf/min	0.006"/rev	0.098 to 0.118"	1	

**Results** Tool life = 9600 holes  
 Increase to tool life through reduction of built-up edge provided by AL insert geometry.

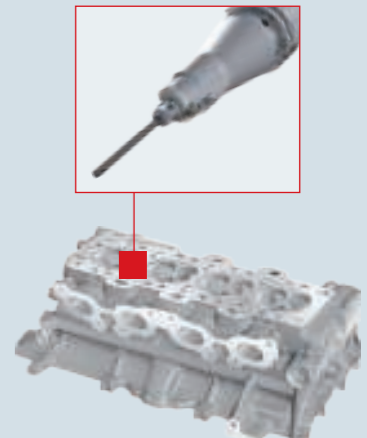


## CYLINDER HEAD – CUSTOM BIFIX® REAMER

Material: Heat resistant sintered steel & brass alloy  
 Coolant: Water soluble oil  
 Operation: Valve seat and guide finishing  
 Criterion: Straightness, concentricity, surface finish, roundness and run out  
 Fixturing: Hydraulic clamping fixture  
 Tool: Custom Quick-Fit reamer with indexable inserts  
 Insert 1: SOHW060202S, CBN 200  
 Reamer: PCD reamer  $\varnothing$  5.00

Cutting data	Metric	$v_c$	$f_z$	$a_p$	$z$
		100 m/min	0.15 mm/rev	0.20 mm	1
Inch	330 sf/min	0.005"/rev	0.008"	1	

**Results** Tool life = 5000 plunging (CBN)  
 Tool life = 150000 holes (PCD reamer)  
 Minimised run out and improved guide straightness and roundness, seat circularity and overall component quality.

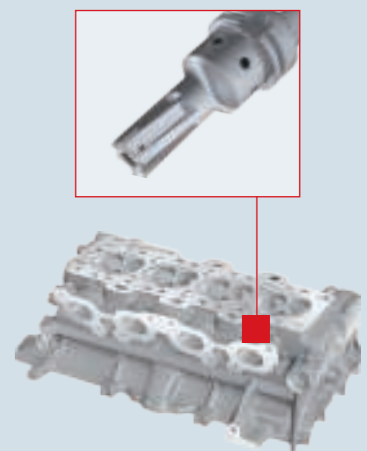


## CYLINDER HEAD – CUSTOM PCD REAMER

Material: Aluminium (SMG 16)  
 Coolant: Water soluble oil  
 Operation: Hydraulic pushers reaming  
 Criterion: H7 tolerance, roundness, cylindricity and surface finish  
 Fixturing: Hydraulic clamping fixture  
 Tool: Custom brazed PCD reamer  $\varnothing$  26 mm  
 Insert 1: None

Cutting data	Metric	$v_c$	$f_z$	$a_p$	$z$
		700 m/min	0.07 mm/tooth	0.2 mm	4
Inch	2295 sf/min	0.0027"/tooth	0.008"	4	

**Results** Tool life = 80000 holes  
 Improved straightness, roundness and surface finish as well as overall component quality.



# CASE STUDIES

## CONNECTING ROD – CUSTOM CHAMFERING & BORING BAR

Material: Forged steel (SMG 4)  
 Coolant: Water soluble oil  
 Operation: Crank bore rough boring (before cracking) and chamfering by circular interpolation  
 Criterion: Tool life  
 Fixturing: Hydraulic clamping fixture  
 Tool: Custom step boring bar  $\varnothing$  49 mm  
 Insert 1: SCMT09T309-F2, TP2500

Cutting data		$v_c$	$f_z$	$a_p$	$z$	$k$
		Metric	280 m/min	0.18 mm/tooth	2.5 mm	2
Inch		920 sf/min	0.007"/tooth	0.098"	2	2

**Results** Tool life = 800 pcs.  
 25% increase to tool life via Duratomic insert grade TP2500.



## CONNECTING ROD – SECO FEEDMAX™ CHAMFER DRILL

Material: Forged steel (SMG 4)  
 Coolant: Water soluble oil  
 Operation: Drilling the 2 bearing cap holes  
 Criterion: No tool deviation allowed  
 Fixturing: Hydraulic clamping fixture  
 Tool: SD245A-C45-9.5-40-14R1

Cutting data		$v_c$	$f_z$	$a_p$
		Metric	75 m/min	0.25 mm/rev
Inch		250 sf/min	0.010"/rev	1.97" D.O.C.

**Results** Tool life = 1350 holes  
 24% increase to tool life and improved hole centering due to drill geometry.

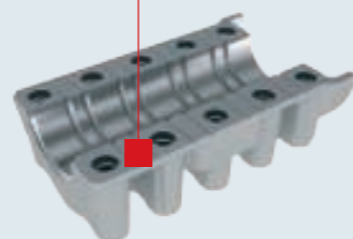
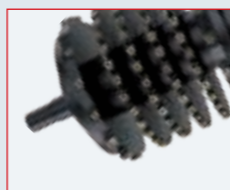


## BEARING CAP – GANG DISC MILLING CUTTER

Material: Cast iron (SMG 13)  
 Coolant: Dry  
 Operation: Bearing cap splitting  
 Criterion: Tool life  
 Fixturing: Hydraulic clamping fixture  
 Tool: Custom gang disc milling cutter  
 Insert 1: Special R.H. insert, HX  
 Reamer: Special L.H. insert, HX

Cutting data		$v_c$	$f_z$	$a_p$	$z$	$k$
		Metric	120 m/min	0.09 mm/tooth	12 mm	32
Inch		395 sf/min	0.0035"/tooth	0.472"	32	16

**Results** Tool life = 3500 pcs.  
 Elimination of adjusting time through highly accurate fixed pocket cutters.



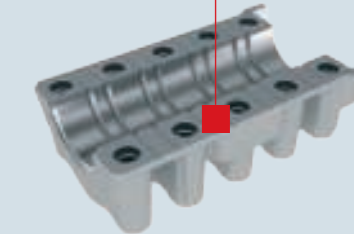
## BEARING CAP – QUATTROMILL® FACE MILLING CUTTER

Material: Cast iron (SMG 13)  
 Coolant: Dry  
 Operation: Finish face milling  
 Criterion: Flatness 0.03 mm (0.001")  
 Fixturing: Hydraulic clamping fixture  
 Tool: R220.53-0125-12-8A

Insert 1: SEEX1204 AFTN M14 MK1500  
 Insert 2: SEEX1204 ZZTN M14 MK1500 (wiper)

Cutting data		$v_c$	$f_z$	$a_p$	$z$
		Metric	160 m/min	0.25 mm/tooth	0.5 mm
Inch		525 sf/min	0.010"/tooth	0.020"	8

**Results** Tool life = 1200 pcs.  
 Overall improvements to surface finish, flatness and part quality.



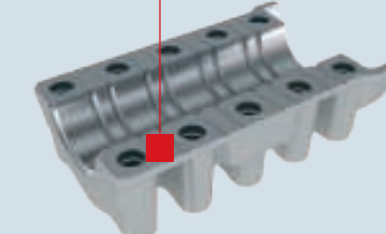
## BEARING CAP – DOUBLE OCTOMILL™ FACE MILLING CUTTER

Material: Cast Iron (SMG 13)  
 Coolant: Dry  
 Operation: Rough face milling  
 Criterion: Tool life  
 Fixturing: Hydraulic clamping fixture  
 Tool: R220.48-0125-09-08S

Insert 1: ONMF090520ANTN-M14, MK1500

Cutting data		$v_c$	$f_z$	$a_p$	$z$
		Metric	220 m/min	0.25 mm/tooth	3 mm
Inch		720 sf/min	0.010"/tooth	0.118"	8

**Results** Tool life = 45 min.  
 Reduced tool cost via 16 cutting edges per double-sided insert.



## PISTON – CUSTOM BORING TOOL

Material: Aluminium AS15 (SMG 17)  
 Coolant: Water soluble oil  
 Operation: Piston axis roughing (2 holes)  
 Criterion: Tool life  
 Fixturing: Hydraulic clamping chuck  
 Tool: Custom boring tool  $\varnothing$  21.6 + /-0.08

Insert 1: CPGW060204F-L1, PCD20

Cutting data		$v_c$	$f_z$	$a_p$	$z$	$k$
		Metric	1015 m/min	0.12 mm/tooth	1.5 mm	2
Inch		3330 sf/min	0.005"/tooth	0.059"	2	2

**Results** Tool life = 60000 pcs.  
 Minimised abrasiveness wear via insert grade PCD20.

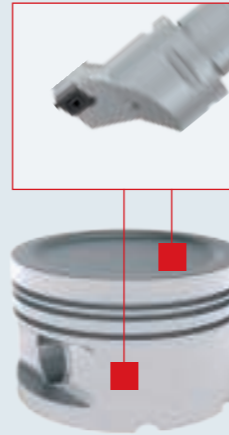


# CASE STUDIES

## PISTON – SECO-CAPTO™ TURNING TOOL

Material:	Aluminium AS15 (SMG 17)			
Coolant:	Water soluble oil			
Operation:	O.D. turning and facing			
Criterion:	Tool life			
Fixturing:	Hydraulic clamping chuck			
Tool:	Seco-Capto C4-SCLCL-27050-09			
Insert 1:	CCMW09T308F-L1, PCD20			
Cutting data	Metric	$v_c$	$f_z$	$a_p$
	Inch	1200 m/min 3935 sf/min	0.15 mm/rev 0.006"/rev	2 mm 0.079"
Cutting data	Metric	$a_e$	$z$	$k$
	Inch	stroke = 65 mm stroke = 2.56"	1 1	1 1

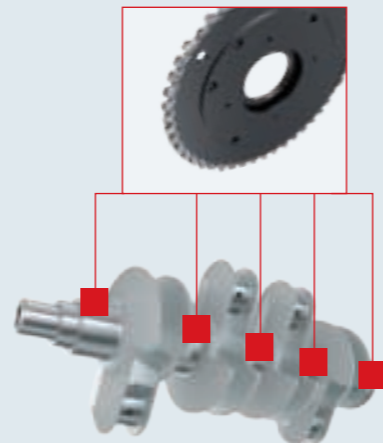
**Results** Tool life = 6500 pcs.  
22% increase to tool life and improved overall part quality.



## CRANKSHAFT – CUSTOM TURN BROACHING DISC

Material:	Forged steel (SMG 4)		
Coolant:	Water soluble oil		
Operation:	Turn broaching of journals		
Criterion:	Tool life		
Fixturing:	Hydraulic clamping fixture		
Tool:	Custom turn broaching disc with 48 cassettes		
Insert 1/2:	WNMG080412W-M3, TP3000 / CNMU120616-M5, TP3000		
Insert 3/4:	NI-LN19-11740, TP200 / Z049264, TP200		
Insert 5:	NI-XN33-12377, CP30		
Cutting data	Metric	$v_c$	$f_z$
	Inch	120 to 200 m/min 395 to 655 sf/min	0.20 to 0.045 mm/rev 0.008 to 0.0018"/rev
Cutting data	Metric	$z$	
	Inch	Number of cassettes per type should be determined for each application	

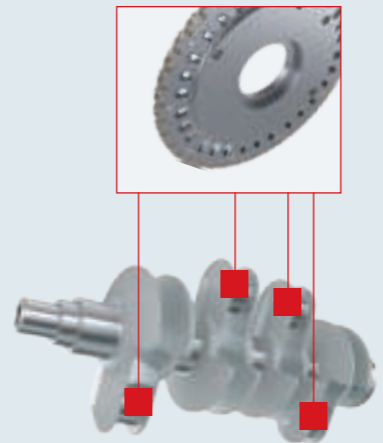
**Results** Tool life = 1200 crankshafts | 30% increase to tool life.



## CRANKSHAFT – CUSTOM PIN MILLING CUTTER

Material:	Forged steel (SMG 4)				
Coolant:	Water soluble oil				
Operation:	Pin milling				
Criterion:	Tool life				
Fixturing:	Hydraulic clamping fixture				
Tool:	Custom R335-65-0750-24.00-Y-02757915 fitted with segments				
Insert 1:	SE426399, T350M				
Insert 2:	SE429249, T350M				
Cutting data	Metric	$v_c$	$f_z$	$z$	$k$
	Inch	245 m/min 805 sf/min	0.23 mm/tooth 0.009"/tooth	240 inserts 240 inserts	60 60

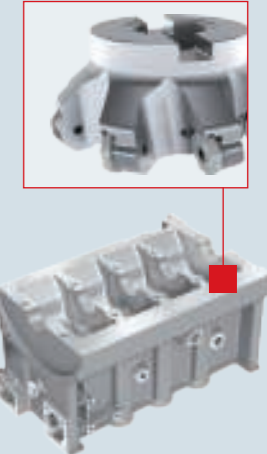
**Results** Tool life = 5000 crankshafts  
Increases to insert life and segment life.



## CYLINDER BLOCK – DOUBLE OCTOMILL™ FACE MILLING CUTTER

Material:	Cast iron (SMG 13)					
Coolant:	Dry					
Operation:	Rough face milling					
Criterion:	Tool life					
Fixturing:	Hydraulic clamping fixture					
Tool:	R220.48-0125-09-08S ONMFO90520ANTN-M14, MK1500					
Cutting data	Metric	$v_c$	$f_z$	$a_p$	$a_e$	$z$
	Inch	220 m/min 720 sf/min	0.25 mm/rev 0.010"/rev	4 mm 0.157"	90 mm 3.54"	8 8

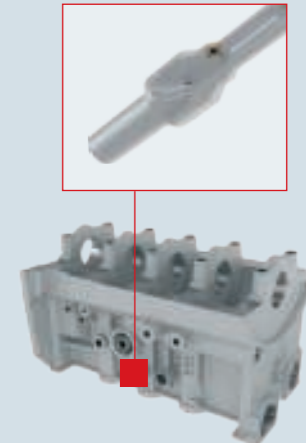
**Results** Tool life = 45 min.  
20% increase to tool life.



## CYLINDER BLOCK – PERFORMAX® DRILL

Material:	Cast iron (SMG 13)			
Coolant:	Water soluble oil			
Operation:	Drilling and chamfering one hole 30mm deep			
Criterion:	Tool life			
Fixturing:	Hydraulic clamping fixture			
Tool:	Custom Performax chamfer drill Ø 16.8			
Insert 1:	SCGX050204-P2, DP2000			
Insert 2:	SPGX0502-C1, T400D			
Cutting data	Metric	$v_c$	$f_z$	$a_p$
	Inch	240 m/min 785 sf/min	0.12 mm/rev 0.005"/rev	16.8 mm 0.661"
Cutting data	Metric	$a_e$	$z$	$k$
	Inch	stroke = 30 mm stroke = 1.181"	3 3	1 1

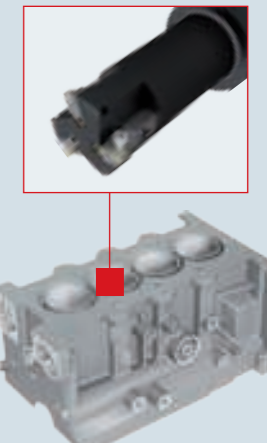
**Results** Tool life = 600 pcs.  
New Duratomic® grade has improved tool life by 25%.

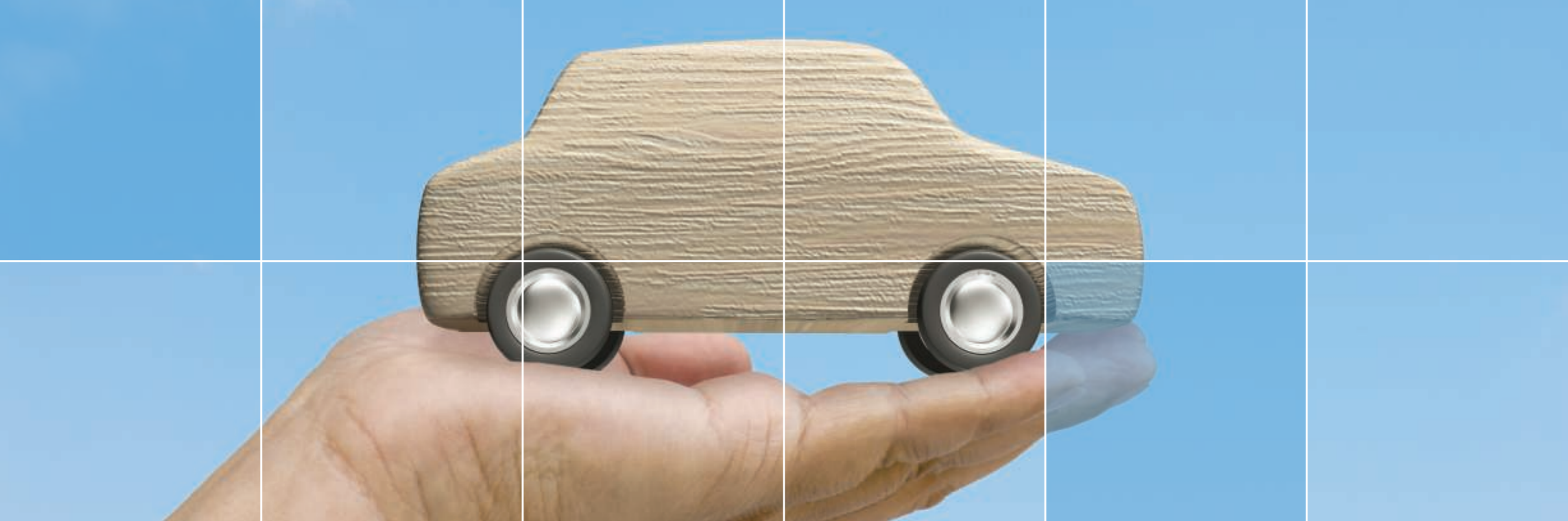


## CYLINDER BLOCK – CUSTOM BORING BAR WITH CBN INSERTS

Material:	Cast iron (SMG 13)	Coolant:	Water soluble oil	
Operation:	Cylinder bore roughing	Criterion:	Tool life	
Fixturing:	Hydraulic clamping fixture			
Tool:	Custom multitooth boring bar Ø 133 mm			
Insert 1:	SNMN090312 S, CBN300			
Cutting data	Metric	$v_c$	$f_z$	$a_p$
	Inch	660 m/min 2165 sf/min	0.17 mm/rev 0.007"/rev	4.6 mm, 3 passes 0.181", 3 passes
1st pass 2.6 mm, 2nd and 3rd passes 1 mm				
1st pass 0.102", 2nd and 3rd passes 0.039"				
Cutting data	Metric	$a_e$	$z$	$k$
	Inch	225 mm stroke 8.86" stroke	6 6	3 3

**Results** Tool life = 400 bores | Reduction to cycle time via roughing grade CBN300 combined with stepped boring bar.





## 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, providing full applications support and the necessary expertise to understand your productivity requirement and deliver a winning solution.

### NETWORK OF APPLICATION EXPERTS

Seco offers through their **Strategic Engineering Group** a global support network, consisting of international component specialists having an in-depth knowledge and understanding of the relevant industry segment. Together with locally based Seco application experts, this team ensures that you get the very best support to the component you are machining.

### INTEGRATED ENGINEERING SUPPORT

Seco's **Component Engineered Tooling (CET)** offers a comprehensive approach to process design and optimisation that ensures you achieve the highest levels of productivity, efficiency and cost effectiveness. Specialising 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 OPTIMISATION

We can assist you with current process evaluation and optimisation using the Seco **Productivity and Cost Analysis software (PCA)**. This tool allows us to benchmark existing processes, documenting them against our proposal for potential improvements. PCA can be fully scaled to meet your unique needs, 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, analysing 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 constantly 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 Programme**; with a commitment to minimising our environmental footprint and conserving non-renewable materials. All aspects of this programme 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 minimise 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 they show 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 re-grinding 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 made simple and efficient. This can be achieved through our user-friendly, point-of-use tool dispensers, tool consumption and inventory levels are tracked and monitored. Inventory replenishment can be automated and you receive reports that make it easy to identify where consumption can be reduced.





## BUILDING EXPERTISE IN OUR

# GLOBAL COMPETENCE CENTRES

### SECO GLOBAL TECHNICAL CENTRES

Seco's Technical Centres are used to engage with our existing and potential customers to facilitate the transfer of expertise and knowledge, for product introduction, industry specific events and engineer customer specific solutions. In addition, 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 PROGRAMME (STEP)

Available at our global technical centres 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 maximising workforce knowledge.

### SECO AUTOMOTIVE WEBSITE

As part of our commitment to automotive manufacturers, Seco developed a comprehensive web resource dedicated to the industry. Featuring a wide variety of video and written content, the website provides information on current trends, process innovations, tool data and documented application successes. The user-friendly site incorporates an interactive automotive model to easily obtain data relevant to machining specific components. To learn more, visit [www.secotools.com/automotive](http://www.secotools.com/automotive).

Scan this code to see more.  
[www.secotools.com/automotive](http://www.secotools.com/automotive)



### SECO CUSTOMER ZONE & ONLINE STORE

To achieve an even greater level of personal interaction with automotive manufacturers, we provide you with access to the Seco Customer Zone - [www.secotools.com/customerzone](http://www.secotools.com/customerzone). This unique web tool provides a wealth of content tailored to your specific needs. From technical applications and product information to interactive training and online ordering. At Seco, we believe that you should always be able to place and monitor the status of orders, regardless of your location or the date or time. The Seco Online Store allows you to research technical information, check product availability, purchase tooling and follow the status of your orders.



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

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