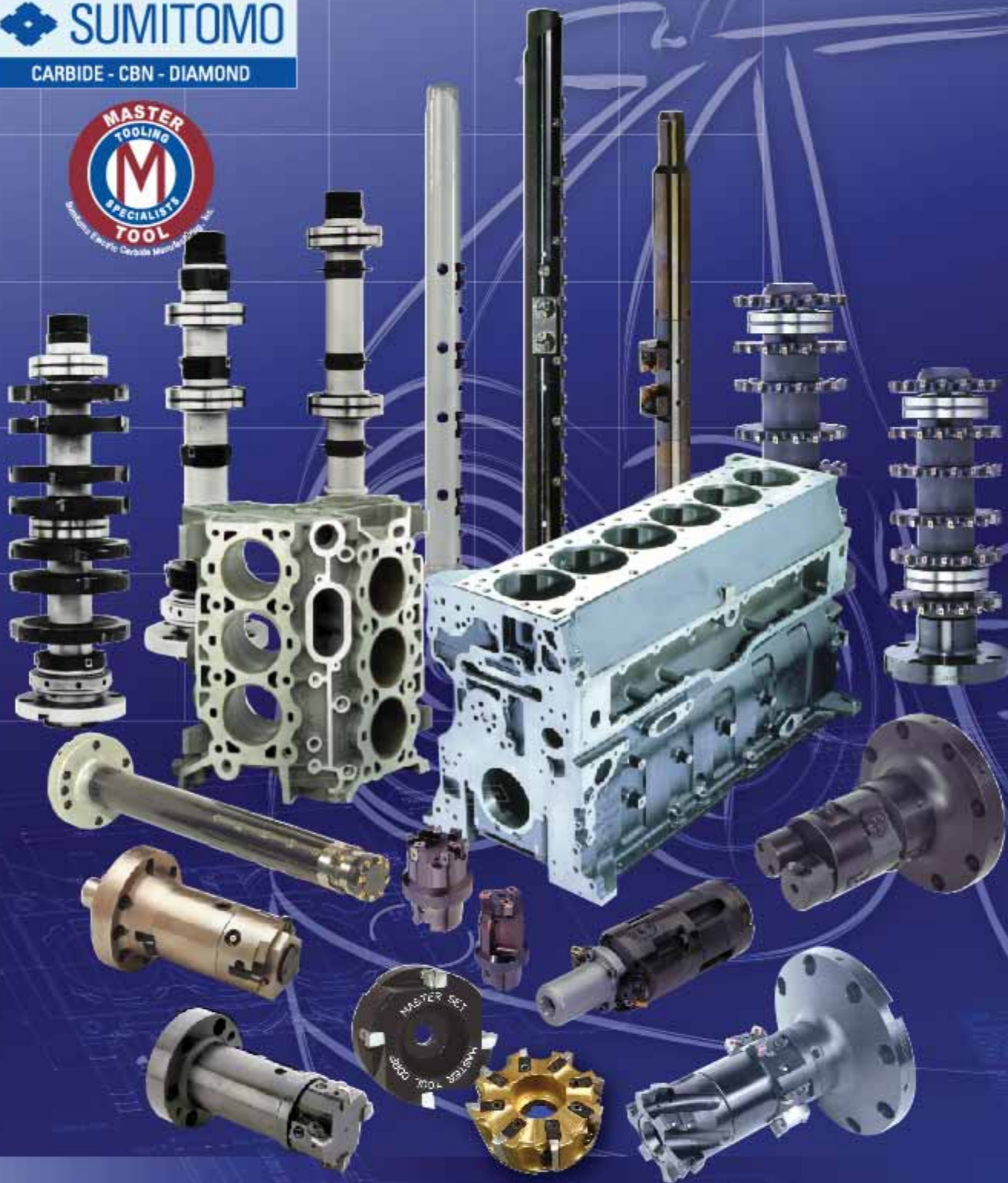


# SPECIAL INSERTED TOOLING



**Sumitomo Electric Carbide Manufacturing, Inc.**  
**MASTER TOOL DIVISION**

210 RIVER STREET, GRAND RIVER, OH 44045 PH: 440.354.0600 FAX: 440.354.6372  
WEB: [www.mtctools.com](http://www.mtctools.com) EMAIL: [master@mtctools.com](mailto:master@mtctools.com)

# ABOUT the COMPANY

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INDEX

Master Tool Corporation now Sumitomo Electric Carbide Manufacturing, Inc. - Master Tool Division has been serving the American Automotive industry for over 35 years. Our 40,000+ square foot manufacturing facility offers full CNC manufacturing capabilities and is centrally located to the market that we serve in **Grand River, Ohio** (30 minutes outside Cleveland, Ohio).



## PART SPECIFIC TOOLING

The Master Tool Division covers your part tooling needs from one station, one operation tools, to complete transfer line packages with innovative cost-savings designs.

We have taken what is traditionally considered specialized tooling and created a standardized line of tooling to meet the demanding cutting applications of the automotive industry and beyond.



## SPECIAL INSERTS

Master Tool Division also offers State of the art CNC carbide insert grinding to meet your special insert needs.

## GENERAL TOOLING

Our innovative designs and concepts used in our part tooling are also integrated in our general tooling designed to meet the rigors of the most demanding cutting application.



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## GENERAL TOOLING:

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### BORING

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## RING GROOVE

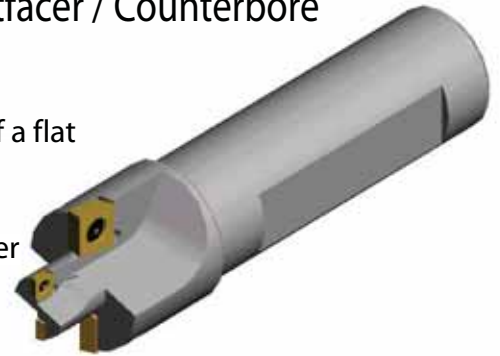
Pages 54-57

## Non-Center Cutting Spotfacer / Plunge Mill.



- Geometric insert design to obtain the highest and best use of a given insert to specific part cut.
- Tool design to achieve maximum performance of a given application on either a boss, lug, spotfacer and counterbores.
  - ISO Inserts
  - Shank Style upon request.
  - Most cost efficient hole, Counterbore or Spotfacer tool where a pre-drilled or cast hole is present.
  - Used in applications overhang is issue and unstable conditions, plunge milling might be the only possible solution.

## Center Cutting Spotfacer / Counterbore



- Used in applications where the need of a flat machined surface is mandatory.
- Three tools in one.
- Center Cutting multi diameter Spotfacer

## Combo Spotfacer and Back Spotfacer



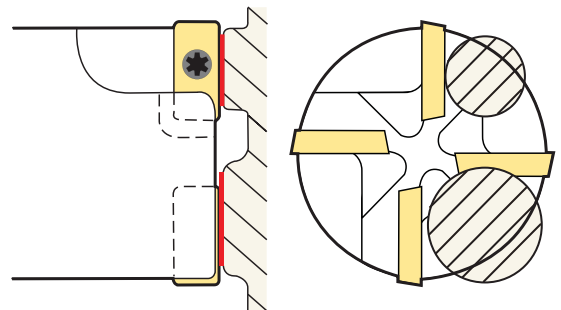
## Boss and Chamfer Hollow Mill



## Fixed Pocket Multiple Bosses Off-Center Cutting

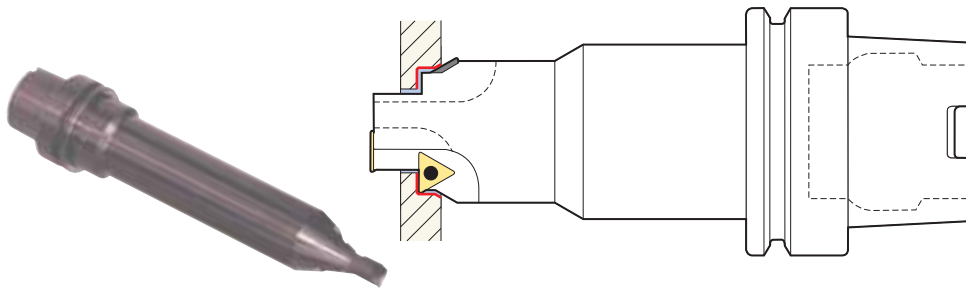


Fixed pocket ISO screw down inserts



Off - Center Cutting

## Fixed Pocket

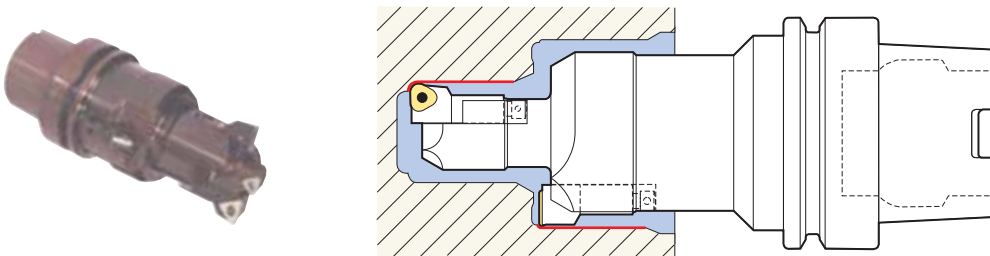


**APPLICATIONS:**  
Rough Bore and Chamfer

-  - Boring
-  - Chamfer

- ISO standard inserts.
- Rough and chamfer on same stroke
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life

## Adjustable Cartridge

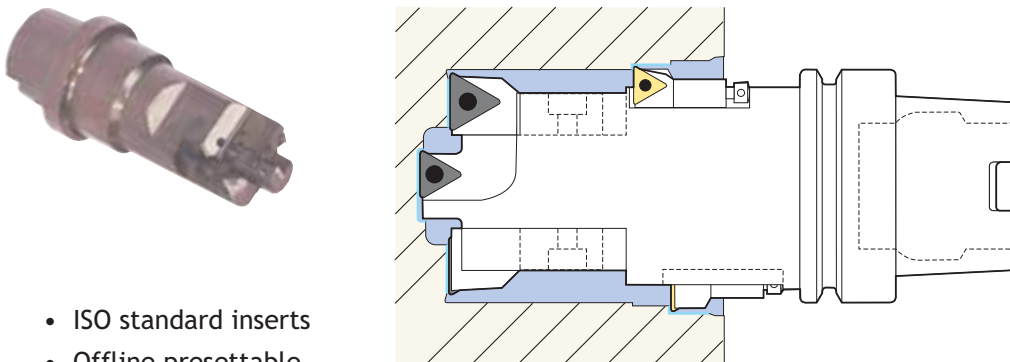


**APPLICATIONS:**  
Semi-Finish and Finish Bore and Chamfer

-  - Boring

- ISO standard inserts.
- Offline pre-settable
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life

## Adjustable Cartridge & Fixed Pocket



**APPLICATIONS:**  
Semi-Finish and Finish Bore, Chamfer and or Face

-  - Boring
-  - Facing

- ISO standard inserts
- Offline presettable
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life

Operation: Core drill / Rough Bore / Finish Bore

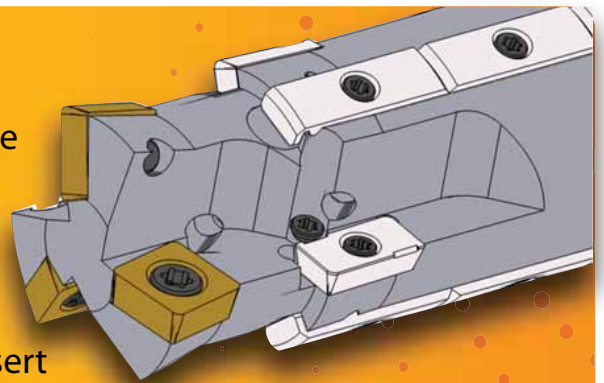
Machined Component: Yoke



Finished Part: Drive Line Parts

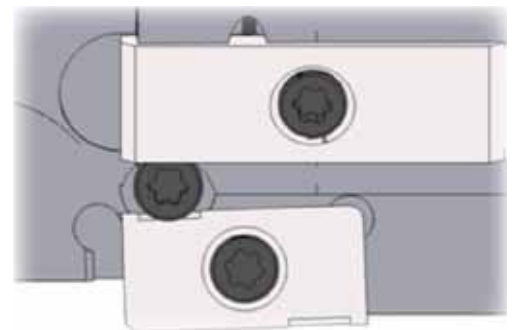
## FEATURES:

- \* Three leading inserts to core hole
- \* Adjustable semi-finish boring insert
- \* Carbide guide pads
- \* Adjustable finish boring insert

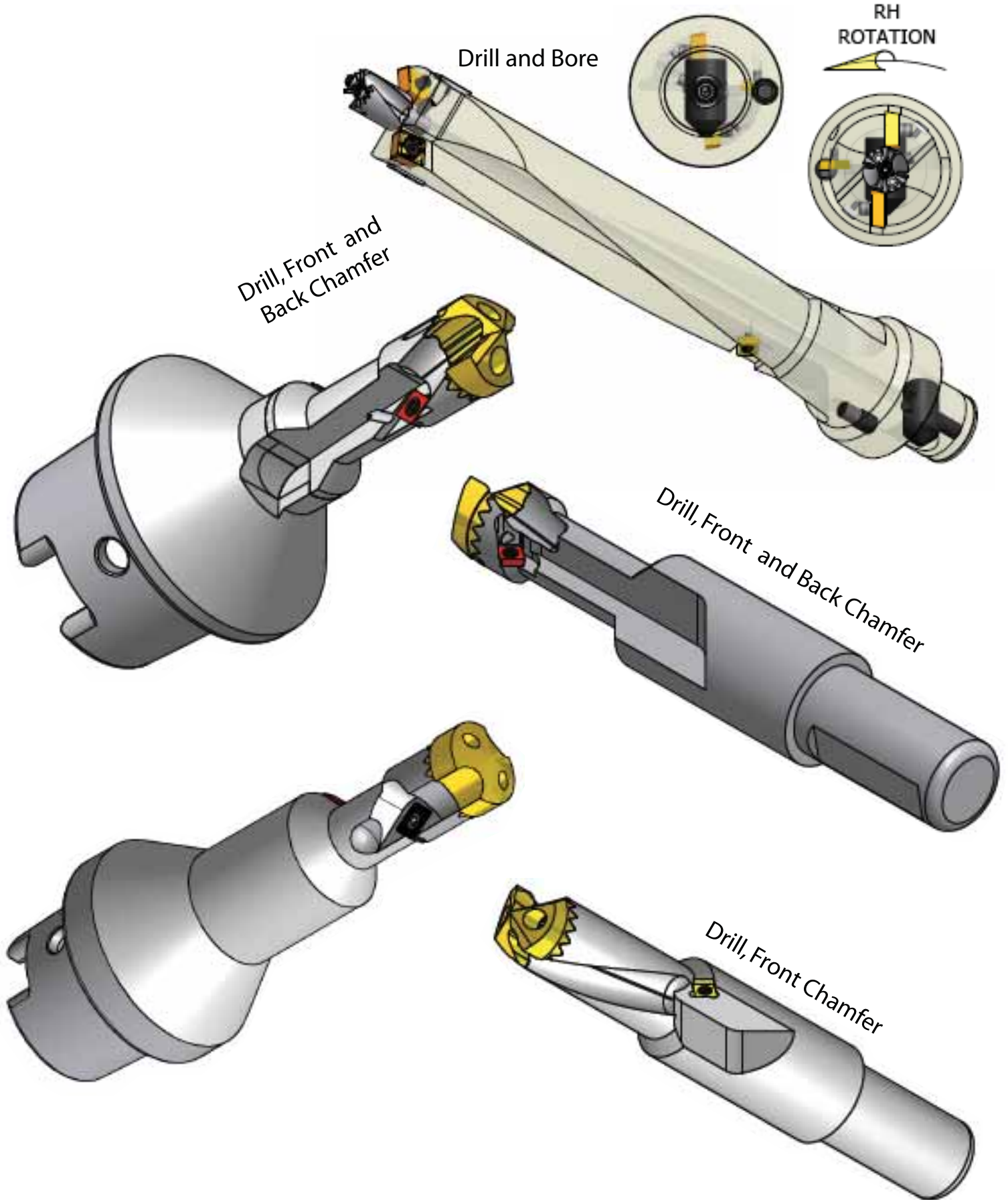


## FEATURES:

- \* Simple adjustment of the finish insert
- \* Built in back taper on finish insert
- \* No withdrawal marks on retract



## Special "SMD" Drills with Replaceable Tip



## MASTER - FEED HIGH DENSITY MILLING CUTTER



**Non-Ferrous Metals**

- \* Aluminum
- \* Bronze Alloys
- \* Copper and Copper Alloys
- \* Brass and Brass Alloys
- \* Magnesium Alloys

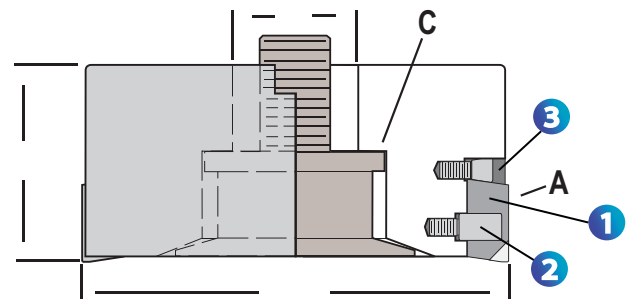
**Bi-Metal**

- \* Grey Iron / Aluminum

**Abrasive Non-Metallics**

- \* Rubber
- \* Carbon
- \* Graphite
- \* Phenolic with Glass
- \* Fiberglass
- \* Carbon Composites

| 1     | 2                | 3               |
|-------|------------------|-----------------|
| Wedge | Wedge Lock Screw | Axial Adj Screw |
| MFW-6 | MFWS-6M          | MFAS-38M        |



| D*    | ORDER NUMBER |             | A     | H       | B    | C             |        |
|-------|--------------|-------------|-------|---------|------|---------------|--------|
| MAX   | RIGHT        | LEFT        | NO.   | OVERALL | BORE | COOLANT SCREW | MAX    |
| O.D.  | HAND         | HAND        | CART. | HEIGHT  | DIA  | OR PLATE      | RPM    |
| 2.50  | MF-025-06-R  | MF-025-06-L | 6     | 2.000   | 1.00 | MCCS-25       | 20,000 |
| 63.5  |              |             |       | 50.8    | 25.4 |               |        |
| 3.00  | MF-03-08-R   | MF-03-08-L  | 8     | 2.000   | 1.00 | MCCS-30       | 20,000 |
| 76.2  |              |             |       | 50.8    | 25.4 |               |        |
| 4.00  | MF-04-12-R   | MF-04-12-L  | 12    | 2.000   | 1.25 | MCCS-40       | 17,320 |
| 101.6 |              |             |       | 50.8    | 31.7 |               |        |
| 5.00  | MF-05-15-R   | MF-05-15-L  | 15    | 2.375   | 1.50 | MCCS-50       | 15,500 |
| 127   |              |             |       | 60.32   | 38.1 |               |        |
| 6.00  | MF-06-18-R   | MF-06-18-L  | 18    | 2.375   | 1.50 | MCCS-60       | 14,150 |
| 152.4 |              |             |       | 60.32   | 38.1 |               |        |
| 8.00  | MF-08-24-R   | MF-08-24-L  | 24    | 2.375   | 2.50 | MCCP-08       | 12,240 |
| 203.2 |              |             |       | 60.32   | 63.5 |               |        |
| 10.00 | MF-10-30-R   | MF-10-30-L  | 30    | 2.375   | 2.50 | MCCP-10       | 10,900 |
| 254   |              |             |       | 60.32   | 63.5 |               |        |

Replacement Parts

\* Standard diameters shown, custom sizes available upon request



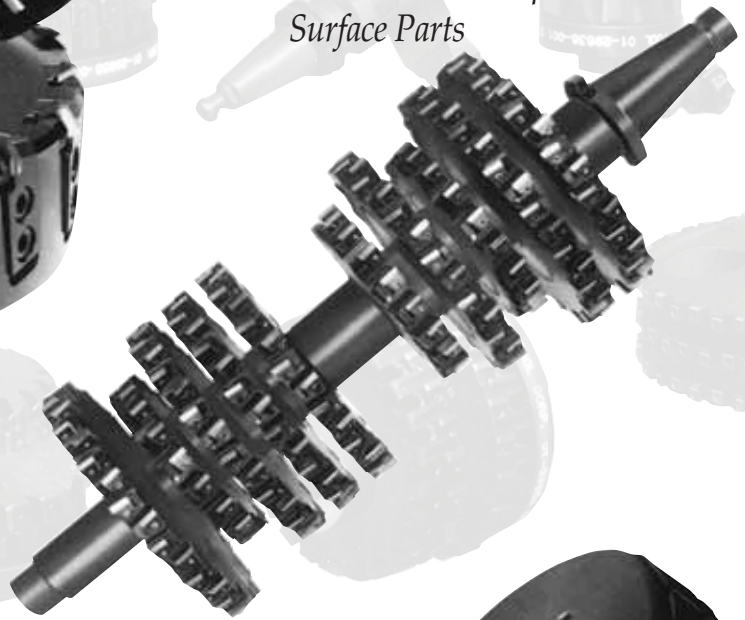
## MASTER TOOL DIVISION

*Specializes in the design and fabrication of milling tools and systems to solve the most unique and difficult metal cutting applications*



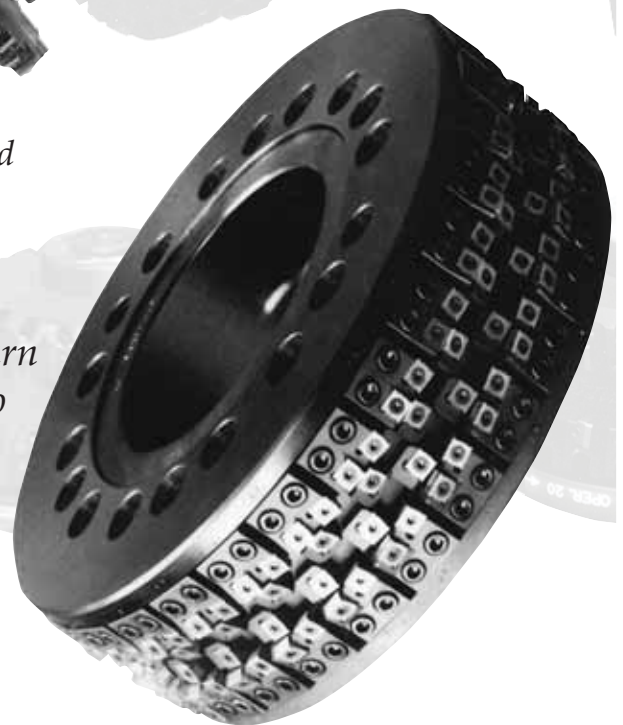
*Complete Milling Systems  
Designed To Machine A  
Family Of Parts*

*Arbor Gang Milling Designed  
To Machine Multiple  
Surface Parts*



*MASTER TOOL DIVISION'S  
Qualified Insert Pockets Are Generated  
Through Our Own CAD/CAM  
System To Produce Perfect Blends*

*Combination Mill-Turn  
Cutters Designed To  
Mill-turn O.D.  
Locator Surfaces In  
A Single Pass*

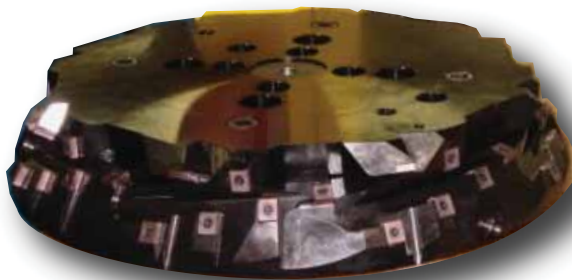




Finished Part:  
Heat Exchanger

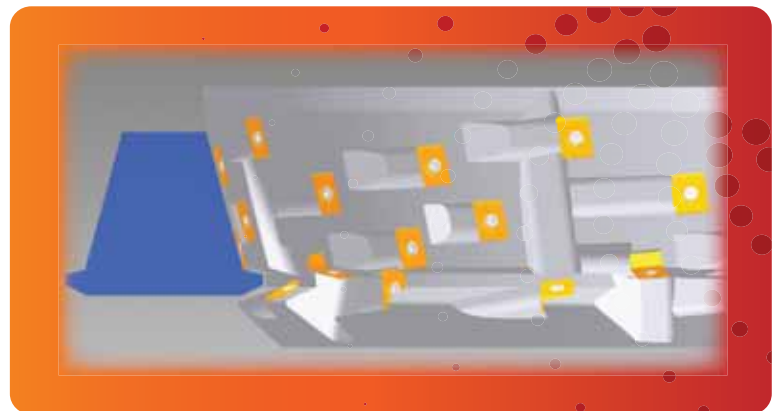


Machined Component:  
Heat Exchanger panels / Weld Prep



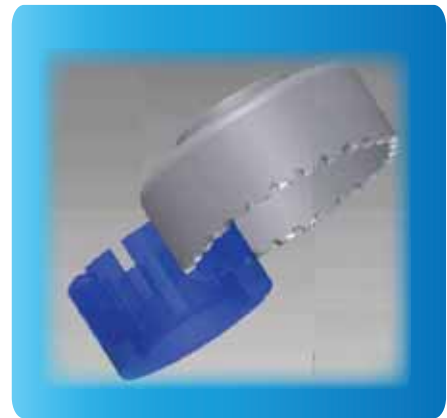
**Master Tool Division's** design for milling the weld preparation of heat exchanger plates feature:

- \* Standard rectangular, face mounted inserts
- \* Fixed pocket insert - no adjustment required
- \* Inserts track within +/- 0.001" (0.025mm) for maximum tool life
- \* Milling cutter machines two (2) weld preps at once (left & right hand sides)
- \* Four cutting edges
- \* Insert in contact with the part surface at all times
- \* One insert grade to machine steel, stainless and cast iron - lower inventory costs
- \* Common inserts between sizes - lower inventory cost
- \* Two to one tool life increase over the nearest competitor



**Finished Part: Internal Gear Pumps**

**Machined Component:  
Internal Pump Vanes**



**Master Tool Division's** design for the milling of the pump vanes for internal Gear Pumps feature:



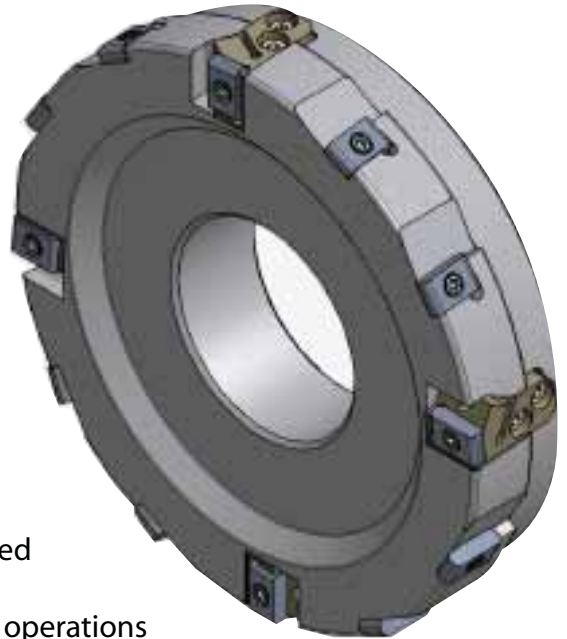
- \* Square, face mounted inserts cutting on both the O.D. and I.D.
- \* Fixed pocket insert - no adjustment required
- \* Inserts track within +/- 0.001" (0.025mm) for maximum tool life
- \* Milling cutter machines two (2) vanes at once
- \* Four cutting edges
- \* Insert in contact with the part surface at all times
- \* One insert grade to machine steel, stainless and cast iron - lower inventory costs
- \* Common inserts between sizes - lower inventory cost
- \* Two to one tool life increase over the nearest competitor

Finish Milling of Cast Iron

HI-FEED MILLING CUTTER with ADJUSTABLE WIPER CARTRIDGE

ADVANTAGES:

- Excellent surface and flatness
- Beats any competitor for tool life on cast iron
- Consist of fixed pocket inserts on the periphery
- Wipercartridges uses same insert as periphery pockets
- Wiper cartridge is easily adjusted
- All inserts have four (4) cutting edges
- Manufactured in the Unites States



DETERMINING NUMBER OF WIPERS REQUIRED:

- Each wiper cartridge covers approx. 0.125" (3mm) of feed per revolution
- Number of wiper cartridges required is determined by operations feed per revolution (see example below)
- Determine the number of cartridges and round up to the next highest "even" number

Cutting Edge for finishing

Arc shaped chipbreaker

Cutting Edge for roughing

Four indexes can be used in the periphery pocket if the insert is rotated.

Flip the insert on its side and four indexes can also be used in the finishing cartridge.

By switching the insert to a left hand cutter, FOUR MORE ROUGHING EDGES can now be used. A total of 12 indexes are possible when using both right and left hand cutters.\*

\*Left-handed cutters are made to order

SPEED: 800 SFM (244 MPM)  
 FEED/TOOTH: 0.009" (0.23 MM)  
 FEED/REV: 0.252" (6.40 MM)

WIPERS REQUIRED = 0.252 DIVIDED BY 0.125" = 2.16 CARTRIDGES

\* **ROUNDED TO THE NEXT HIGHEST EVEN NUMBER = 4 WIPER CARTRIDGES REQUIRED**

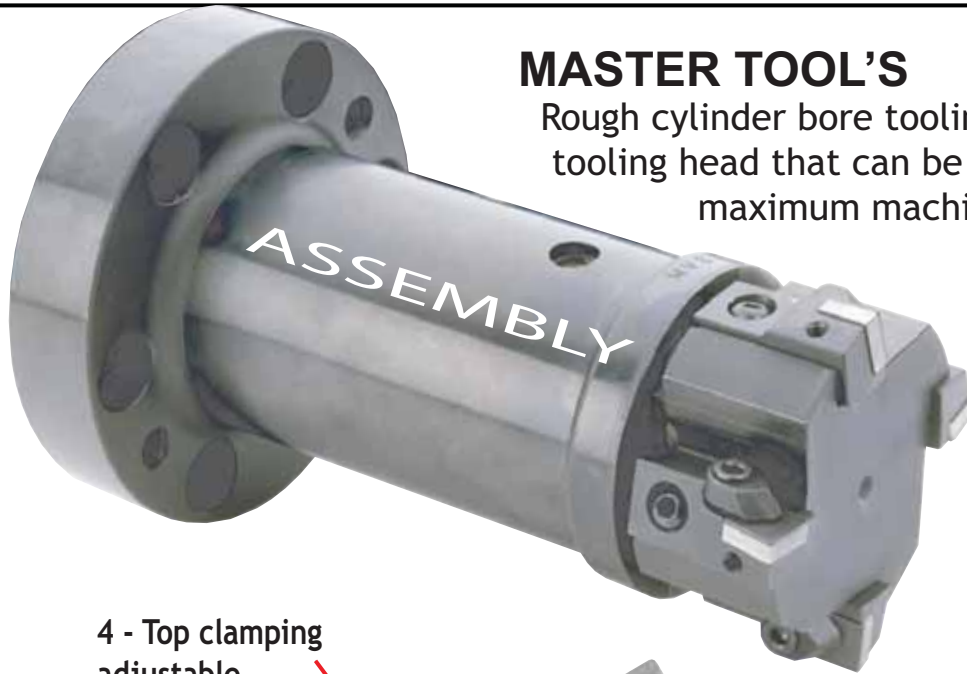
# BLOCK TOOLING

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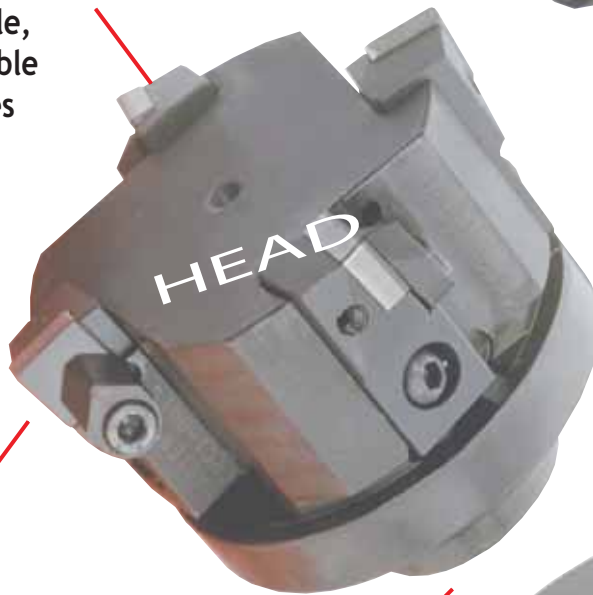


## MASTER TOOL'S

Rough cylinder bore tooling offers a quick change tooling head that can be Preset off the machine for maximum machine uptime



4 - Top clamping adjustable, replaceable cartridges

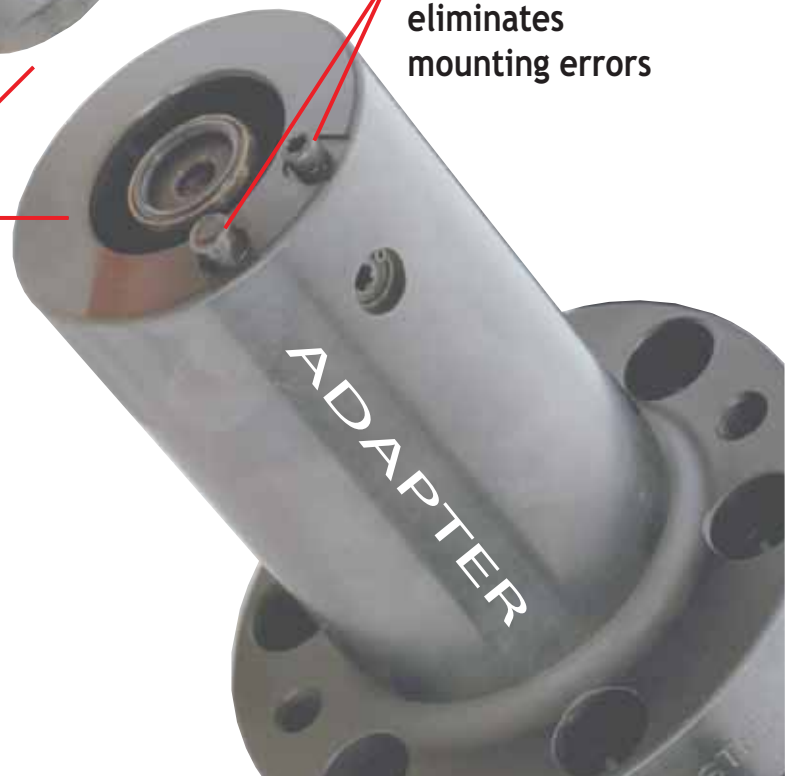


CBN inserts for maximum tool life

Locator and error proofing pin eliminates mounting errors

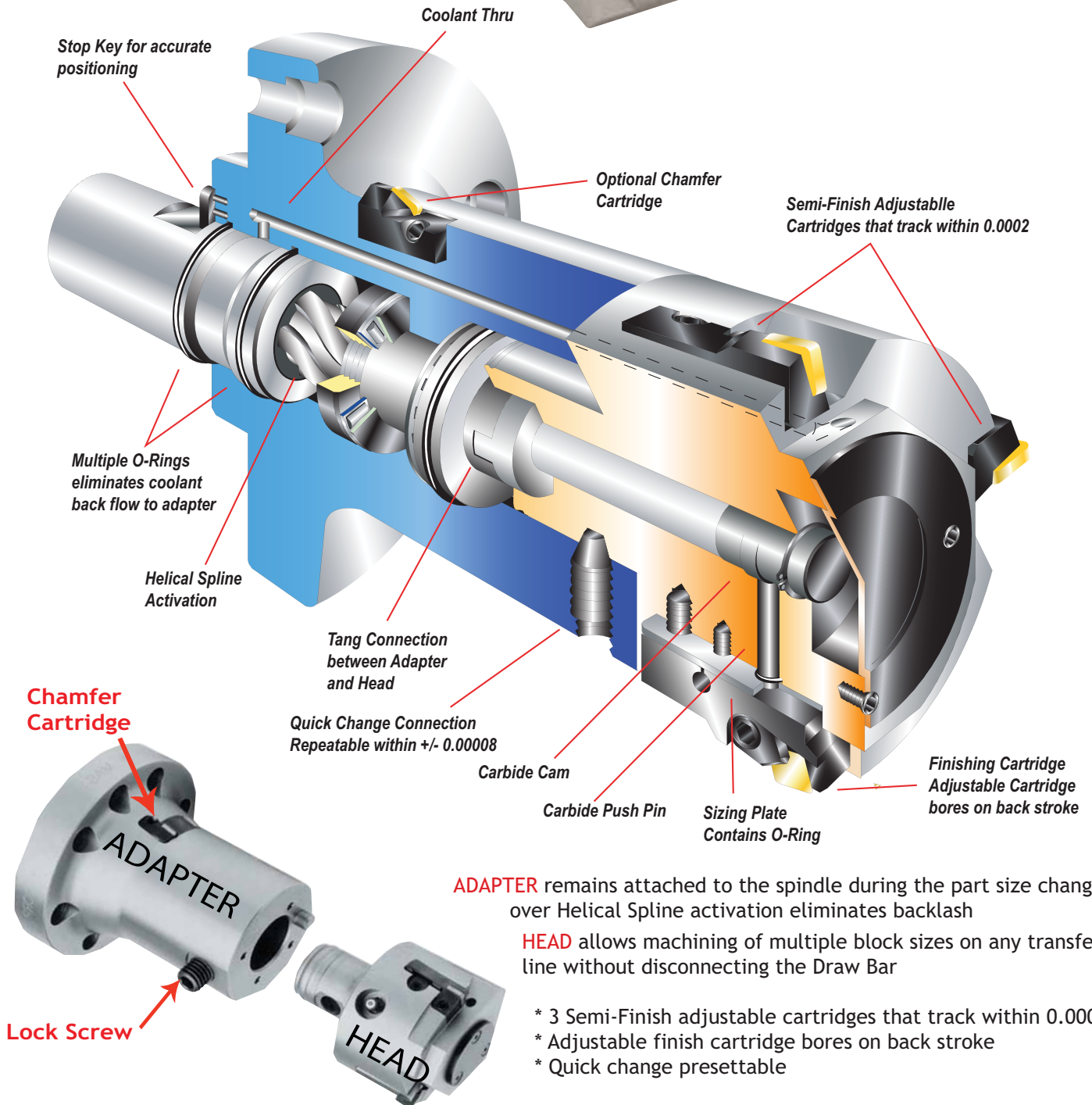
NWH Quick Change Cutting Head

- Tapered shank for repeatability
- Quick change design for maximum machine uptime during changeover



**MASTER TOOL DIVISION'S**

Helical Driven Quick Change head design allows machining of multiple block sizes to CPK's of 2.5 and better on any transfer line without disconnecting the drawbar.



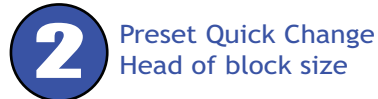
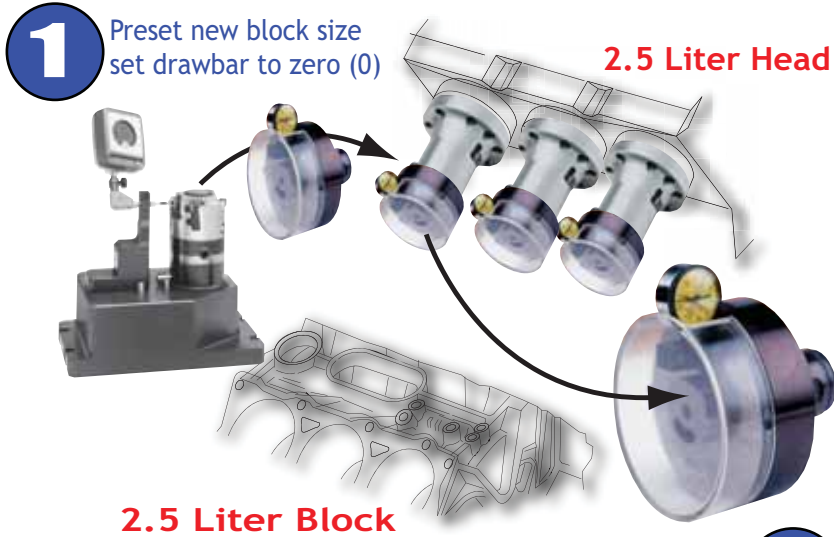
**ADAPTER** remains attached to the spindle during the part size change over Helical Spline activation eliminates backlash

**HEAD** allows machining of multiple block sizes on any transfer line without disconnecting the Draw Bar

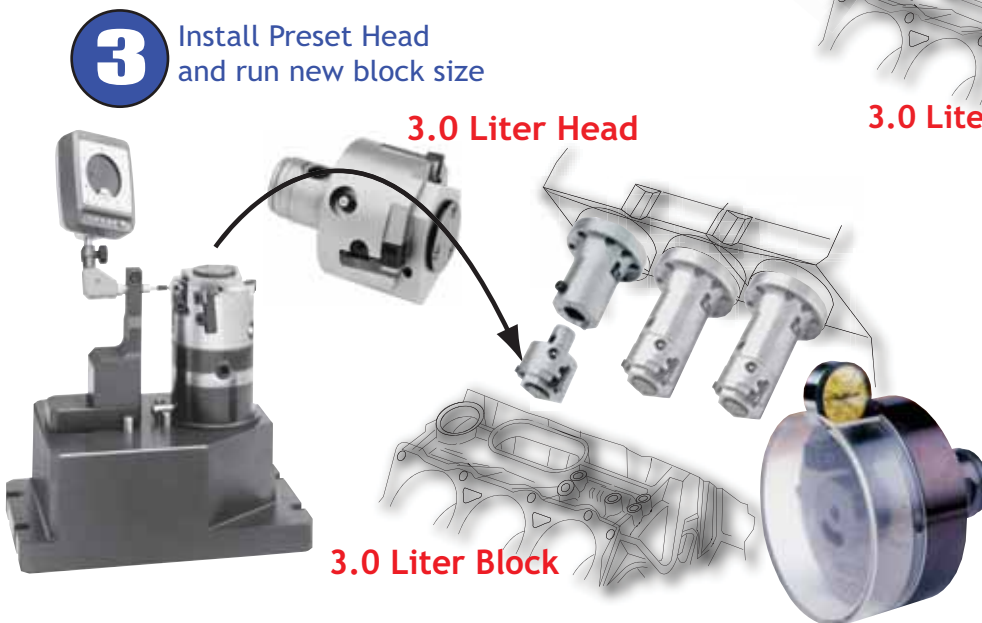
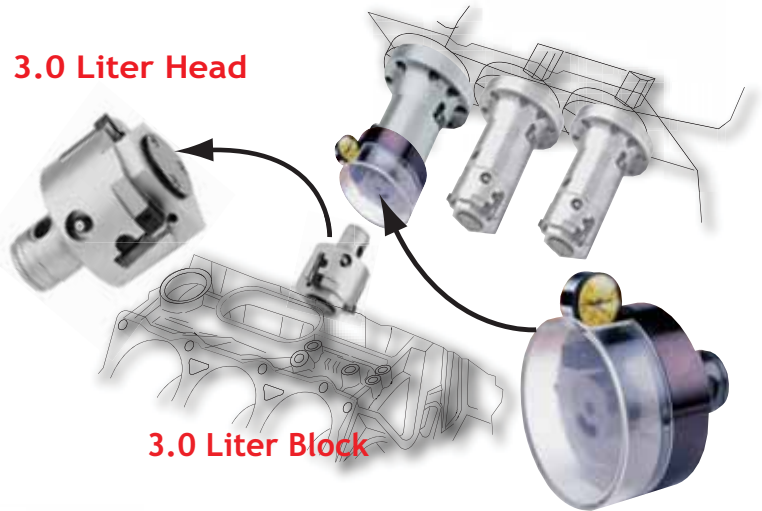
- \* 3 Semi-Finish adjustable cartridges that track within 0.0002"
- \* Adjustable finish cartridge bores on back stroke
- \* Quick change presettable

## Changing Block Sizes On An Existing Transfer Line IS AS EASY AS....

Offline presettable quick change heads along with in line gaging enables " **FIRST PART - GOOD PART** " block size changeovers



Draw Bar Presetting Gage used to set the Draw Bar on all spindles to the identical stroke length





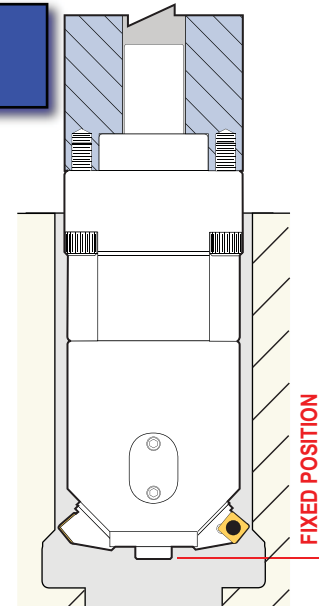
## MASTER TOOL DIVISION'S

Hone clearance generating head offers the ability to generate standard 45° on hydraulically actuated spindles or multiple angle cuts on servo actuated spindles



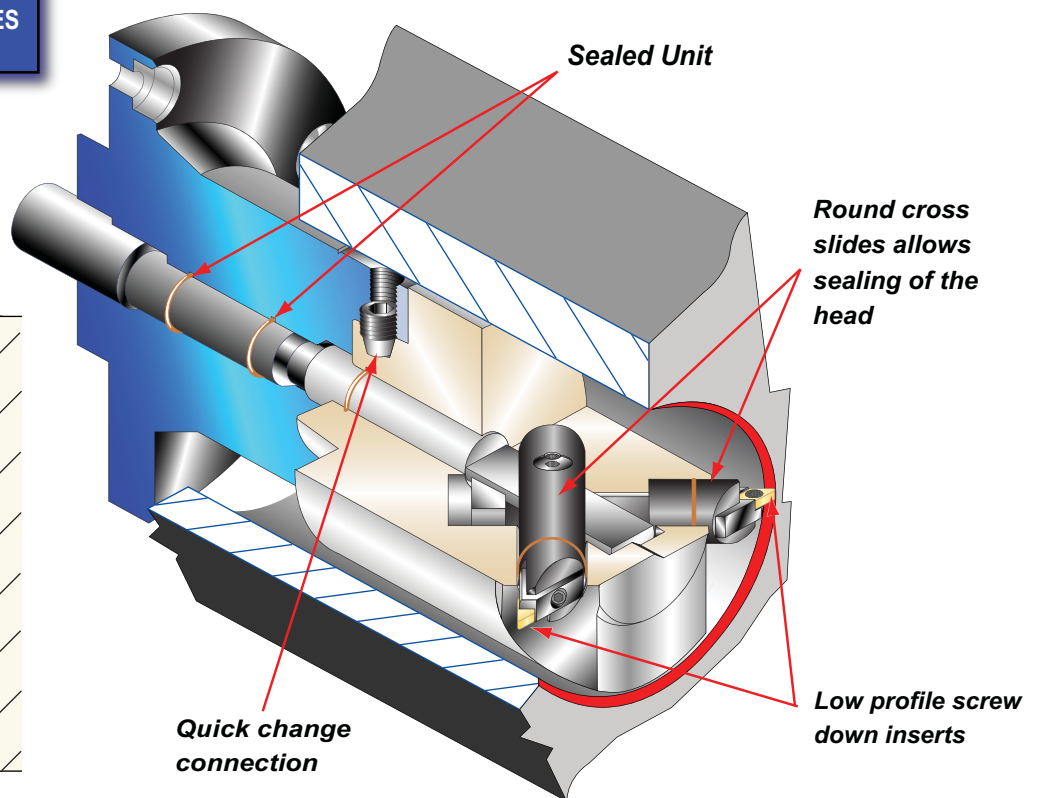
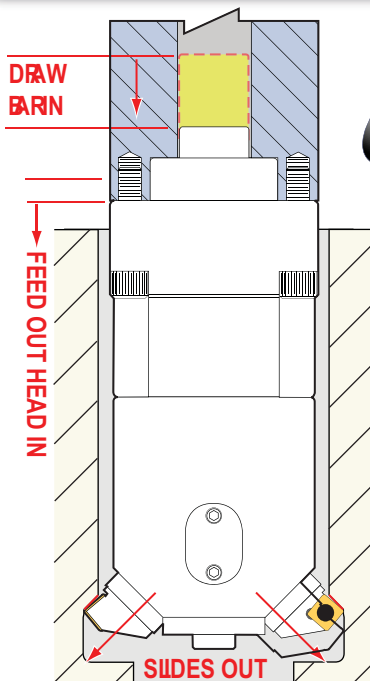
### STANDARD 45 DEGREE ANGLE CUT

1. FEED OUT HEAD FEEDS TO A FIXED POSITION



- Simple, mechanical action
- No potential for chatter
- Most economical solution
- Machine standard 45°
- Generate other angles using a servo
- Faster than circular interpolation
- Sealed unit keeps internal components free of dirt and contaminants

3. DRAW BAR STROKES IN AND FEED OUT HEAD MOVES IN AT A TIMED RATE WHICH GENERATES THE DESIRED ANGLE OF CUT



[Back to Index](#)

## MASTER TOOL DIVISION'S

Hone Clearance milling cutter head offers the ability to use a standard 2 1/2 axis machining center circular interpolate clearance needed for the honing tool



### ADAPTER:

- Rigid design for maximum performance
- Quick Change Tool Adapter, allowing rapid tool changes without the need of tool re-qualification
- Available in flange mount or tapered spindle coolant ready

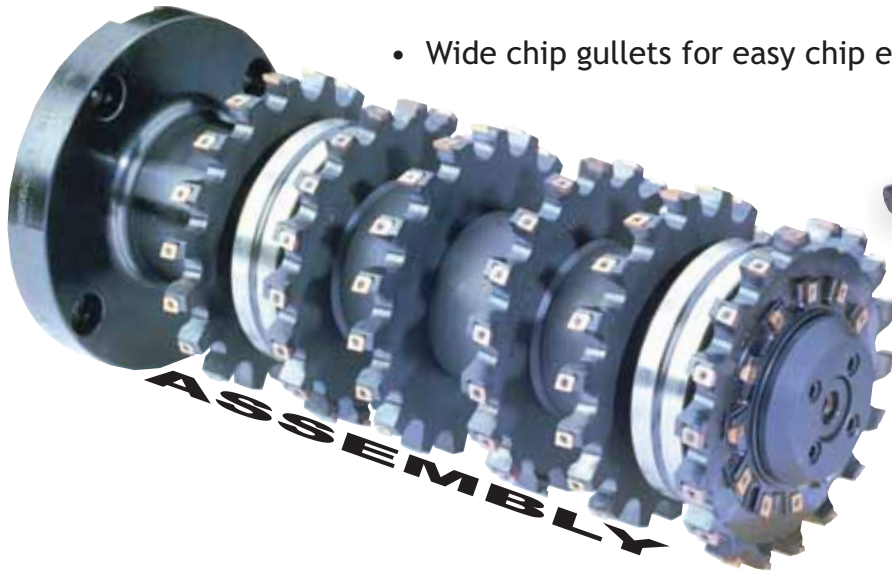


### HEAD:

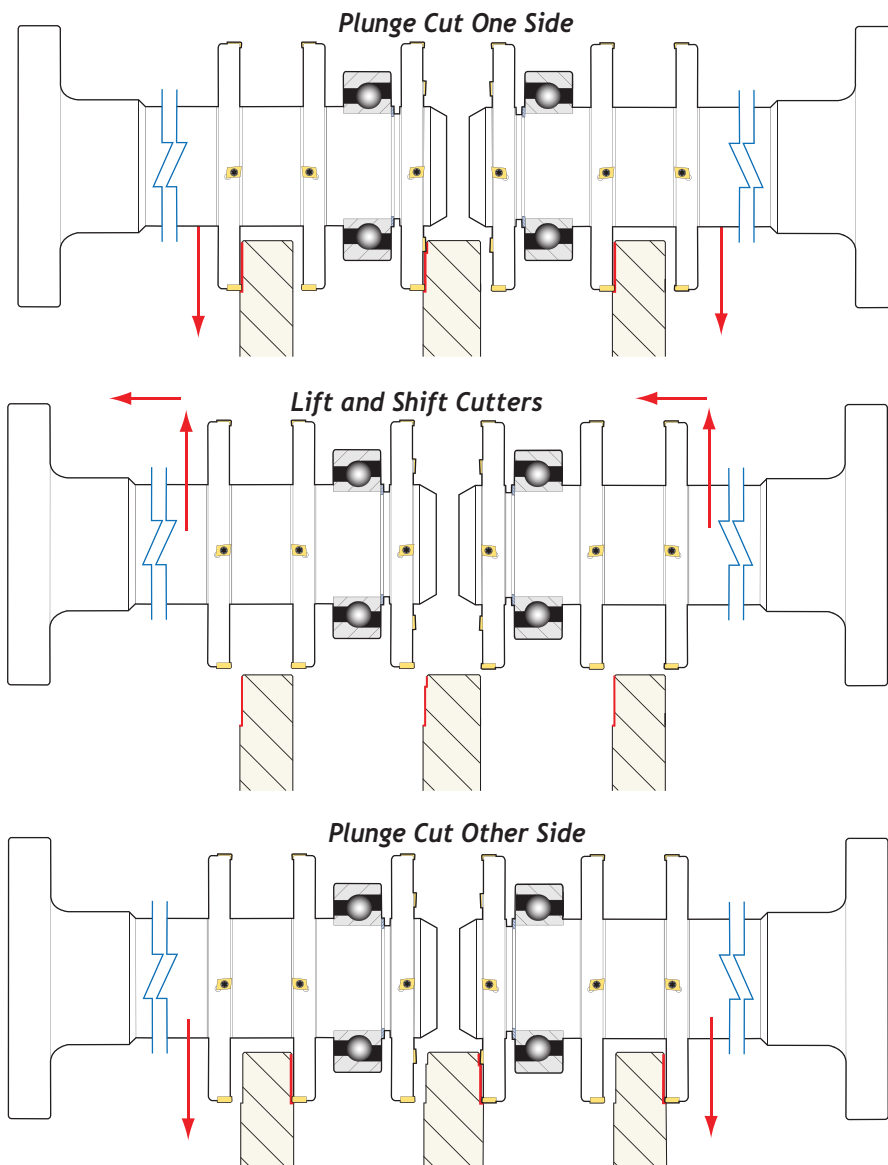
- Used on most CNC applications
- No need for a draw bar thru the spindle



- Fixed Pocket Inserts track within 0.0008"
- Wide chip gullets for easy chip evacuation



- Helical key way arbor staggers common cutters which **ELIMINATES MULTI-KEY STEPPING**



## MASTER TOOL DIVISION'S

### Bayonet Arbor Adaptor and Helical Key Way Arbor

dramatically reduces tool change down time.



**PATENTED** bayonet quick change adapter **LOWERS DOWNTIME** during tool changes



Helical key way arbor **STAGGERS** common cutters which **ELIMINATES MULTI-KEY STEPPING**

**BAYONET ADAPTER-**  
Releases arbor within a 60 degree rotation

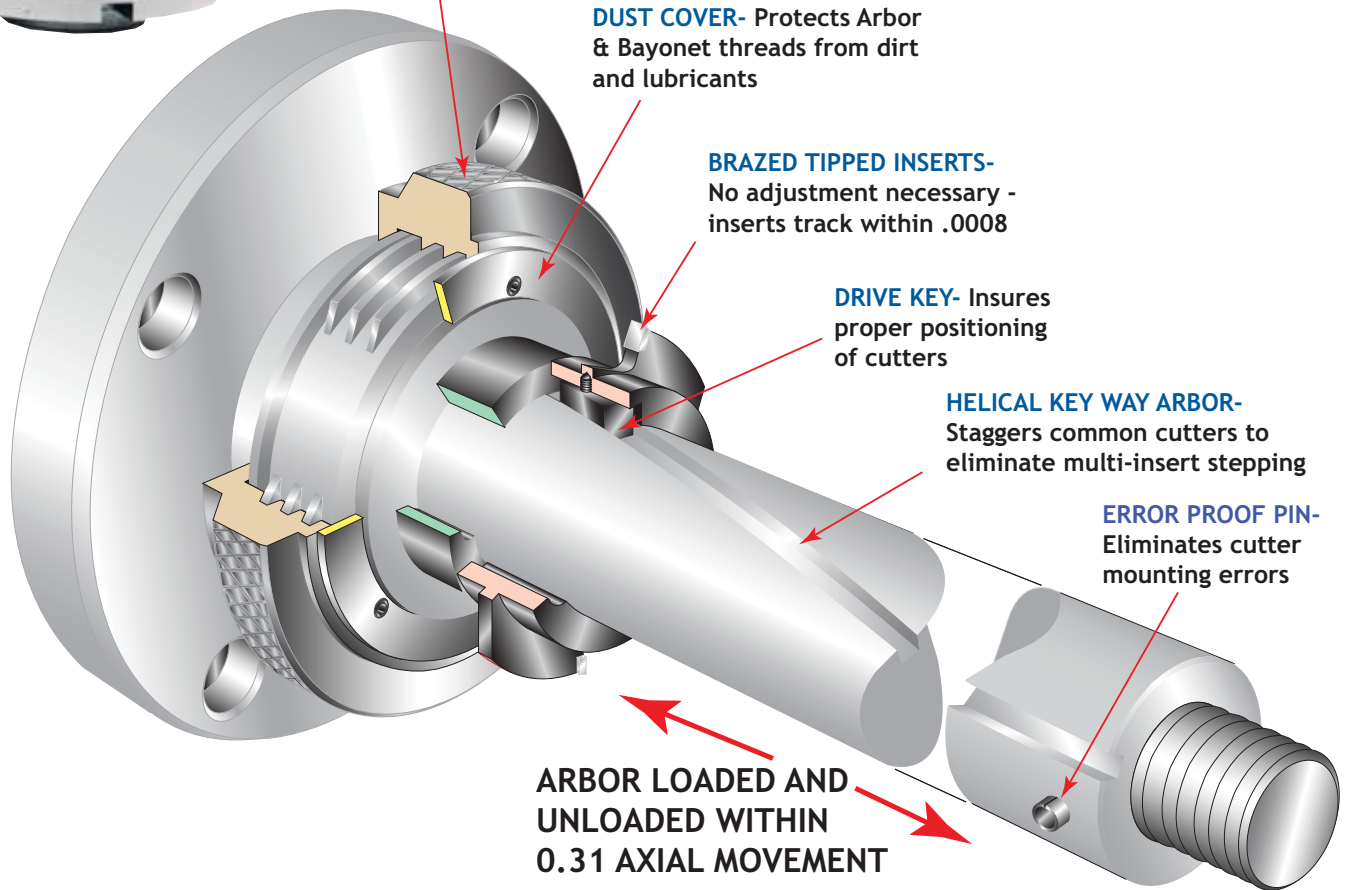
**DUST COVER-** Protects Arbor & Bayonet threads from dirt and lubricants

**BRAZED TIPPED INSERTS-**  
No adjustment necessary - inserts track within .0008

**DRIVE KEY-** Insures proper positioning of cutters

**HELICAL KEY WAY ARBOR-**  
Staggeres common cutters to eliminate multi-insert stepping

**ERROR PROOF PIN-**  
Eliminates cutter mounting errors



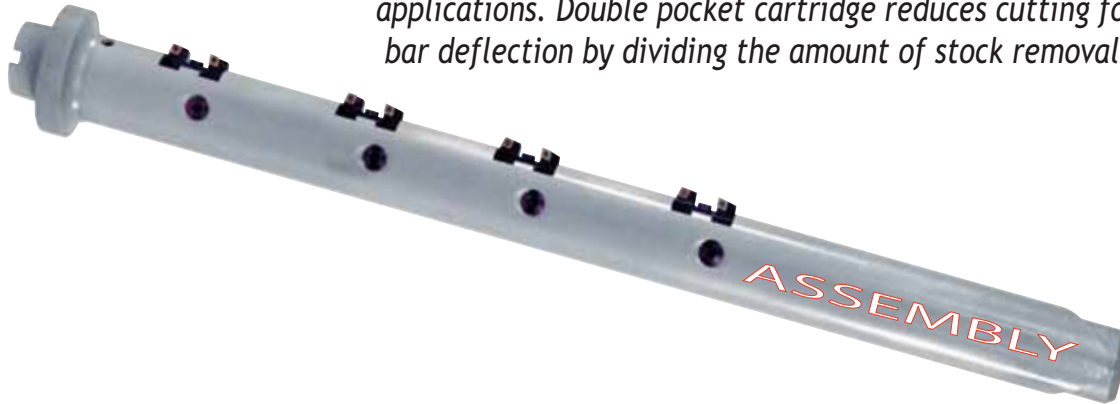
**ARBOR LOADED AND UNLOADED WITHIN 0.31 AXIAL MOVEMENT**

# BLOCK TOOLING: Semi-Finish and Finish Bore Double Pocket

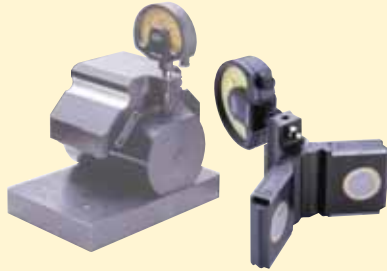
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## MASTER TOOL DIVISION'S

Recommended choice for finish line boring applications. Double pocket cartridge reduces cutting forces and total bar deflection by dividing the amount of stock removal in half.



Master Tools V-Gage and Set Master Allows for easy Offline Presetting

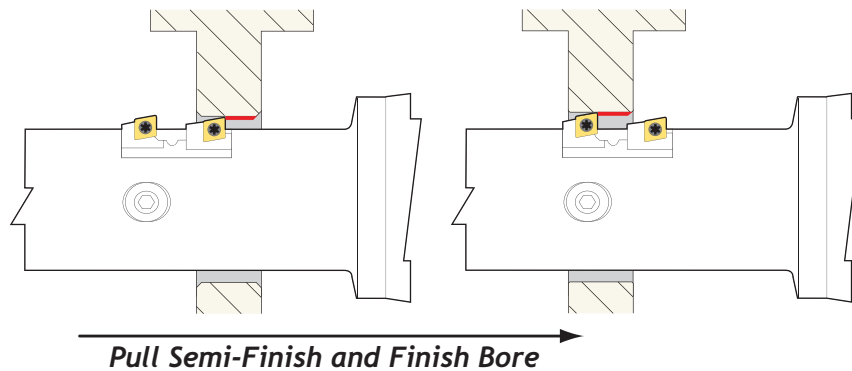


- Magnetic Locking Base - ensures gage will stay in place
- Set master zero's indicator on the gage outside the machine
- Gage design positions against the cartridge for accurate positioning over the finishing insert

- Superior results over conventional Line Bar designs  
Up to 2-1/2 times superior hole roundness and straightness  
Tool life increase of up to 300%
- Double Pocket Cartridge  
Fixed Semi-Finish Position with Adjustable Finish Position  
Preboring ahead of Finish boring allows for minimal stock removal and reduced bar deflection
- Carbide Cam Adjustment increases bar stiffness by 50%

### General Description:

Double pocket boring cartridge Push, Pull or push and pull (Pull Shown)



| CUSTOMER                      | MATERIAL | INSERT MATERIAL | NO. OF BLADES  | SPEED (SFM) | FEED (FPR) | TOOL LIFE # OF HITS | COST PER PIECE | CPK's |
|-------------------------------|----------|-----------------|----------------|-------------|------------|---------------------|----------------|-------|
| Daimler Chrysler, Trenton, MI | Bi-Metal | C2 R4 Coated    | 1-Semi / 1-Fin | 300         | .005       | 1000                | \$.012         | 5.8   |

Results obtained from a existing installation, more results are available upon request

## MASTER TOOL DIVISION'S

Recommended choice for rough line boring applications.

Double pocket cartridge reduces cutting forces and total bar deflection by dividing the amount of stock removal in half.



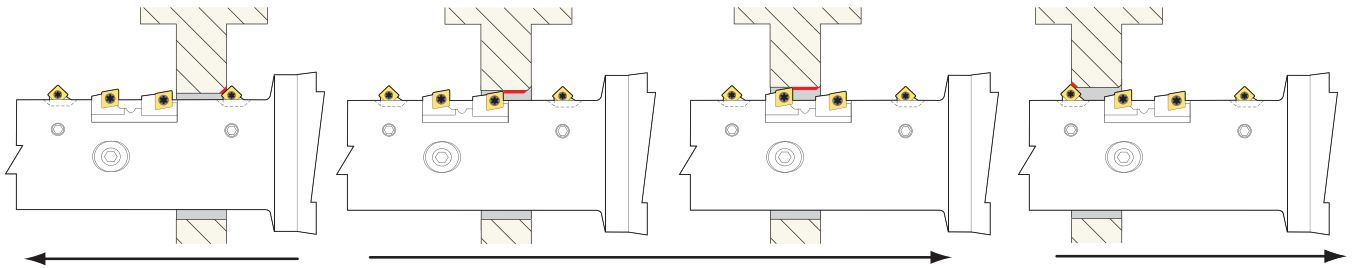
Master Tools V-Gage and Set Master Allows for easy Offline Presetting



- Magnetic Locking Base - ensures gage will stay in place
- Set master zero's indicator on the gage outside the machine
- Gage design positions against the cartridge for accurate positioning over the finishing insert

- Adjustable double pocket cartridge design  
Pre-boring ahead of finish boring allowing for minimal stock removal and reduced bar deflection
- Carbide cam adjustment increases bar stiffness
- Dual chamfer cartridges for both sides of the journal allows the finish bore inserts to start simultaneously and eliminate burrs on the exit
- Chamfer cartridge eliminates possible cutting problems in the finish station by  
Eliminating burrs  
Eliminating breakout  
Eliminating insert chipping

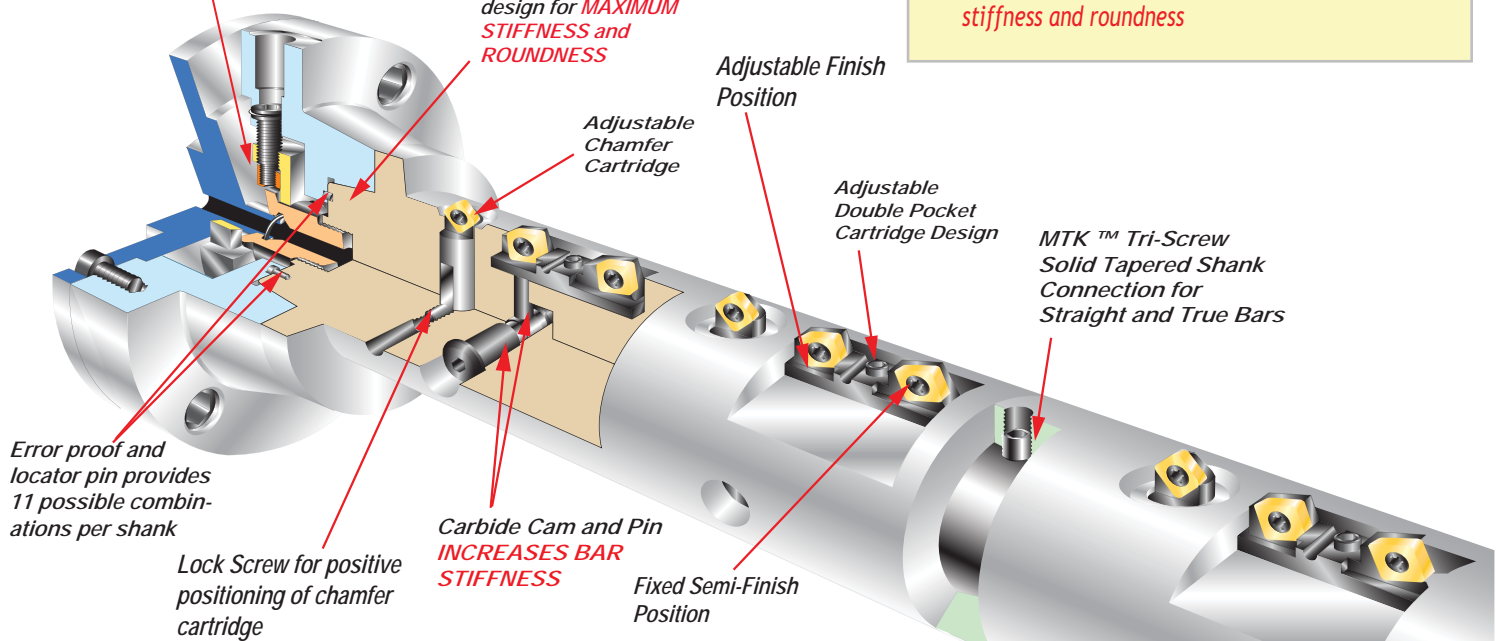
Double pocket boring cartridge with dual chamfer cartridges Push, Pull or push and pull (Pull Shown)



MTK™ Lock System ensures **POSITIVE LOCKING** and **EASY** release of the Line bar

Solid tapered shank design for **MAXIMUM STIFFNESS** and **ROUNDNESS**

- Optional push or pull design (Pull Recommended)
- Solid tapered shank design for maximum stiffness and roundness



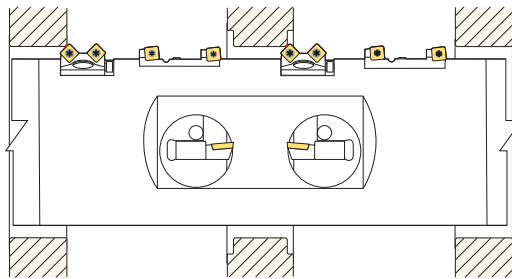
## MASTER TOOL DIVISION

Has combined their PROVEN feed out and line boring technology to perform Finish Crank Bore and Thrust Wall facing into **ONE STATION.**

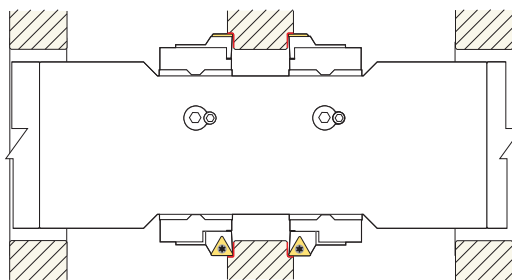
ASSEMBLY

- Double Pocket Cartridge
  - Fixed Semi-Finish Position with Adjustable Finish Position
  - Pre-boring ahead of Finish boring allows for minimal stock removal and reduced bar deflection
- Carbide Cam Adjustment increases bar stiffness by 50%
- Segmented bar design with MTK™ Tri-Screw Solid Tapered Shank Connection for Straight and True Bars
- Precision Jig Ground Serrated Pads provide uniformity of cut
- Field replaceable serrated pads reduces downtime

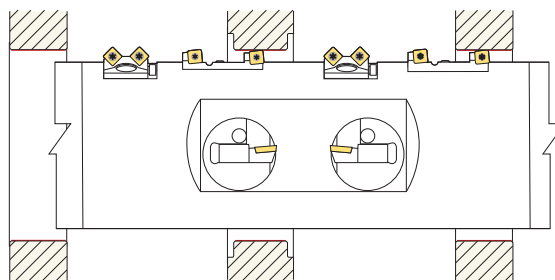
### CHAMFER JOURNALS



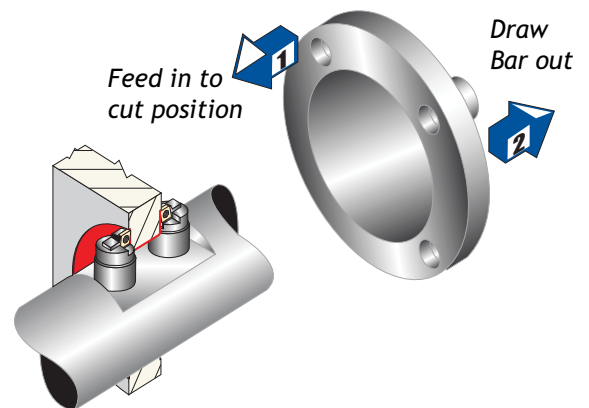
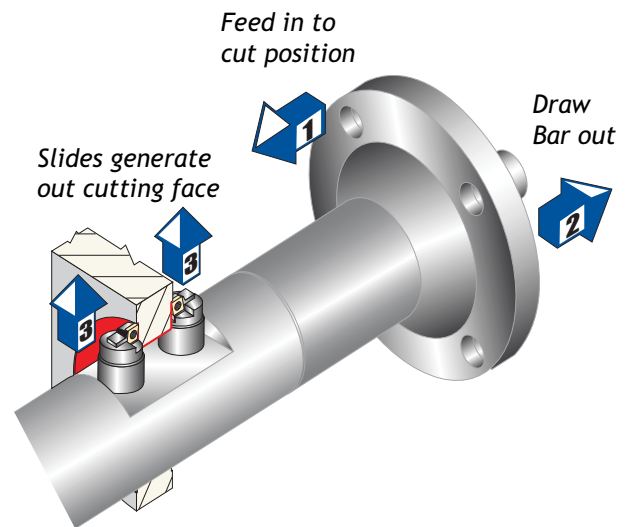
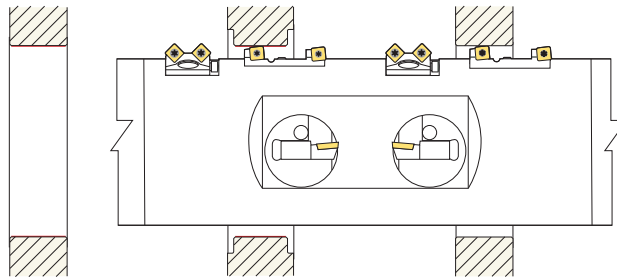
### FEED OUT AND FACE THRUST WALL



### SEMI-FINISH JOURNALS



### FINISH JOURNALS

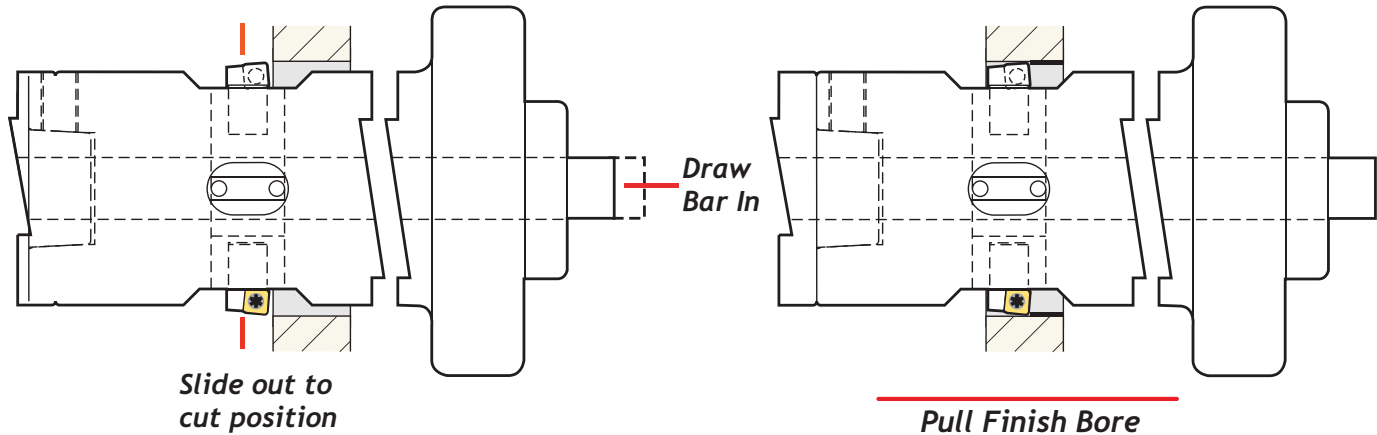


# BLOCK TOOLING: Feedout Semi-Finish & Finish Bore Double Cut

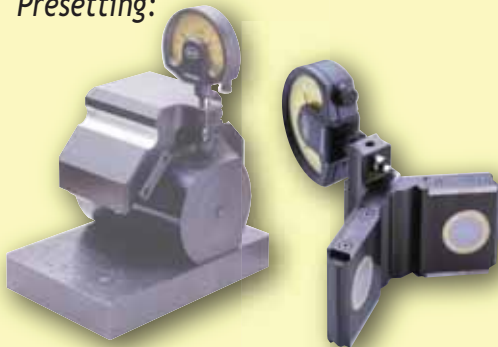
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*Slide out to cut position*

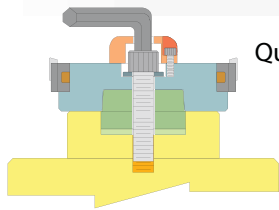


*Master Tool Division's V-Gage and Set Master Allows for easy Offline Presetting:*

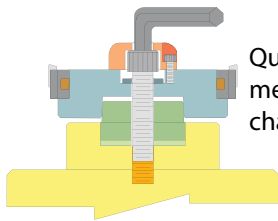


- *Magnetic Locking Base - ensures gage will stay in place*
- *Set master zero's indicator on the gage outside the machine*
- *Gage design positions against the cartridge for accurate positioning over the finishing insert*



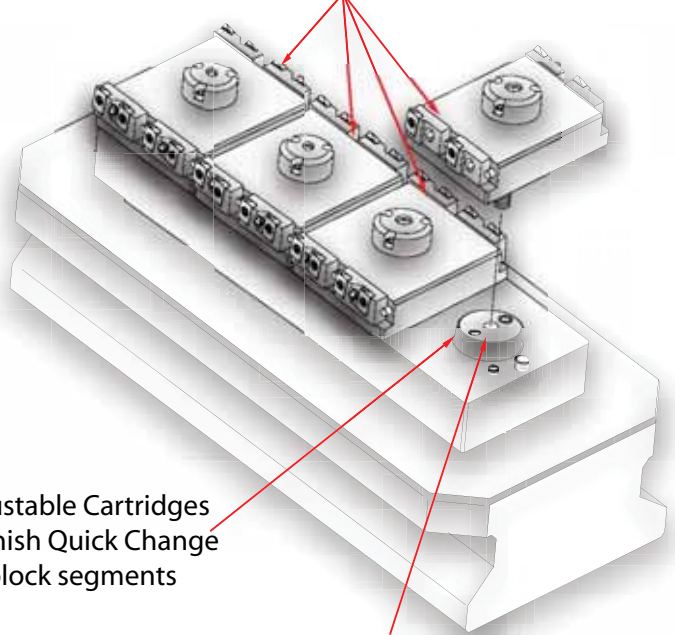


Quick Change block locking mechanism measures proper alignment and locking of quick change base



Quick Change block locking mechanism easily unlocks the quick change base from the HSK tapered shank

Quick Change block segments (Rough, Semi-Finish & Finish)



Adjustable Cartridges on finish Quick Change block segments

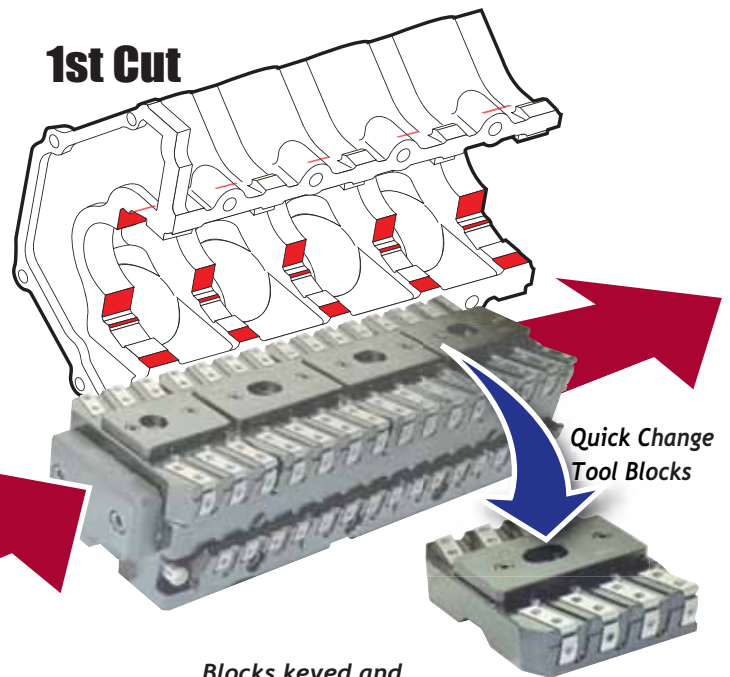
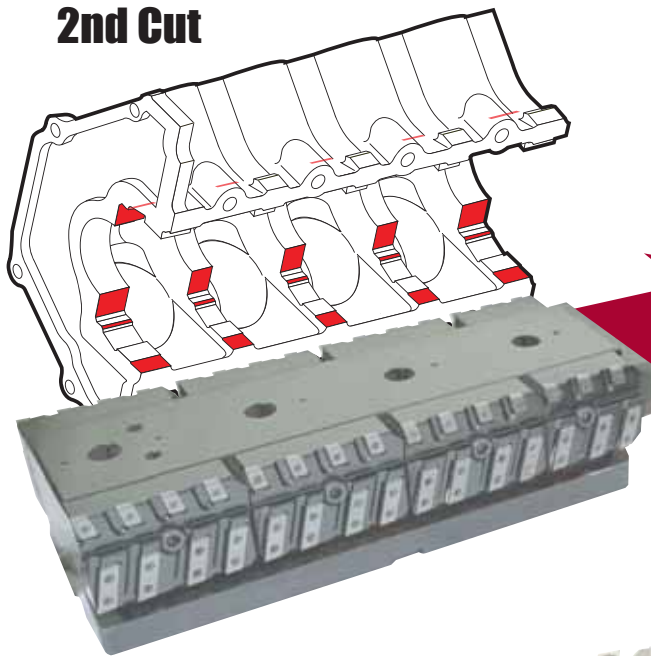
Dowel Pin and Error Proof Locator for mounting of segments

## Multi-Cut Bearing Cap Pad Broach

- NO Brazed Teeth
- NO Regrinding
- Fixed Pocket Indexable Insert

2nd Cut

1st Cut



Quick Change Tool Blocks

Blocks keyed and error proofed for exact positioning

# HEAD TOOLING

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## Master Tool Division's Adapter Subplate **STANDARDIZES**

Valve Seat Adapter assembly by conforming to any spindle size

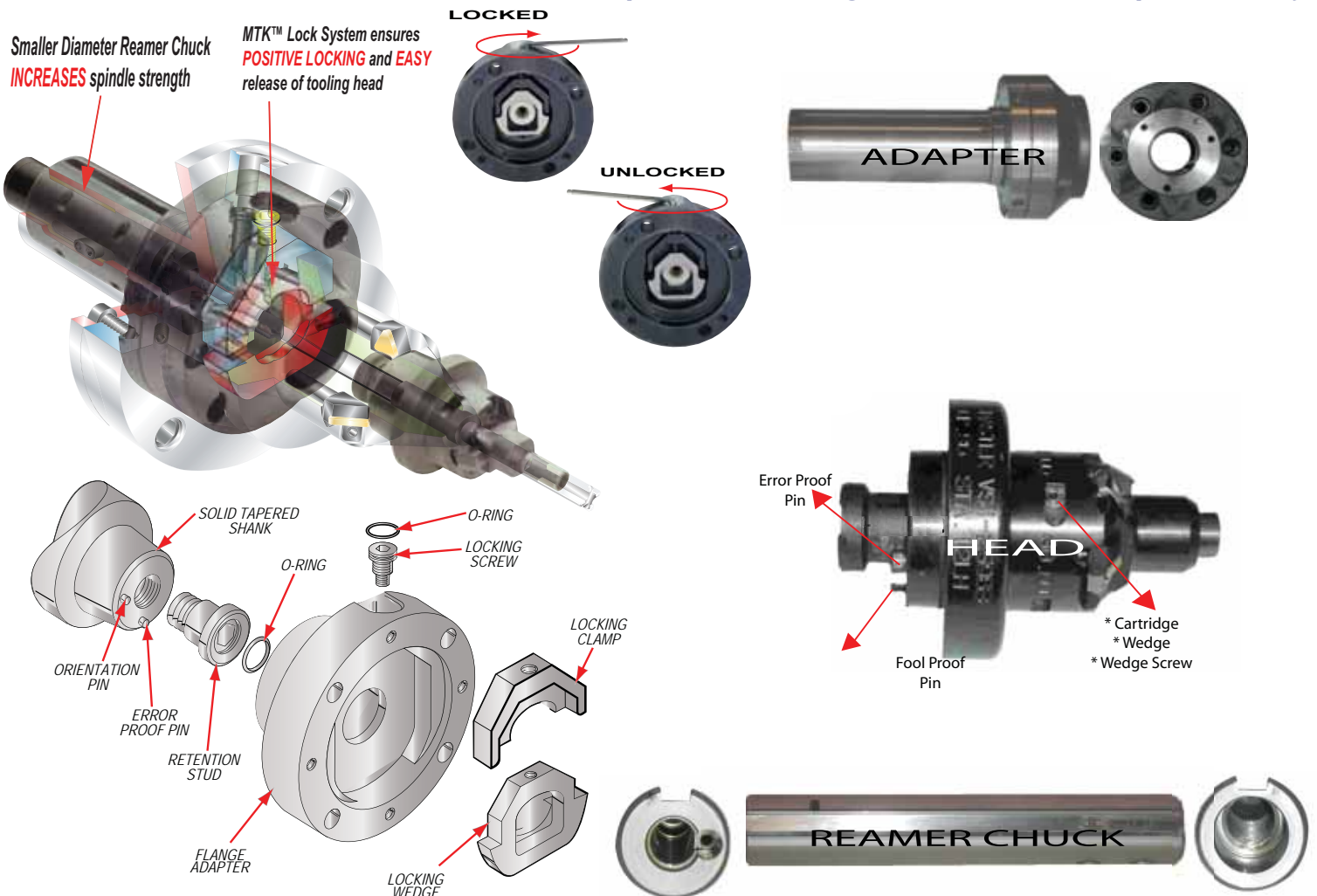


- New installations or retrofit existing installations
- Adapter can be trammed (one time) to zero to eliminate run-out
- Can replace expensive generating head or antiquated flange mount tools

- Ground, round shank cartridge fits into jig ground hole in tool  
Ensures **NO MOVEMENT**  
Competitors cartridge can flex outward when adjusted
- Wedge design permits using CBN, Carbide or Ceramic inserts
- Carbide bushing is jig ground concentric to tapered shank  
Ensures concentricity of stem to guide  
Improves reamer life
- ISO Standard inserts - common between exhaust and intake  
Reduces inventory  
Lower cost per piece  
No regrindables
- Complete error proofing between exhaust and intake

## Master Tool's MTK™ "Touch Fit" Mounting System

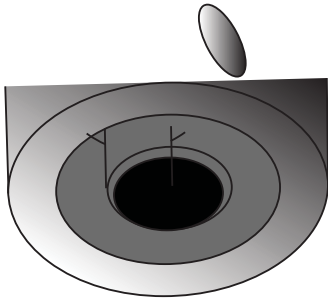
Ensures tooling concentricity throughout the valve seat and valve seat operation along with .000050 repeatability



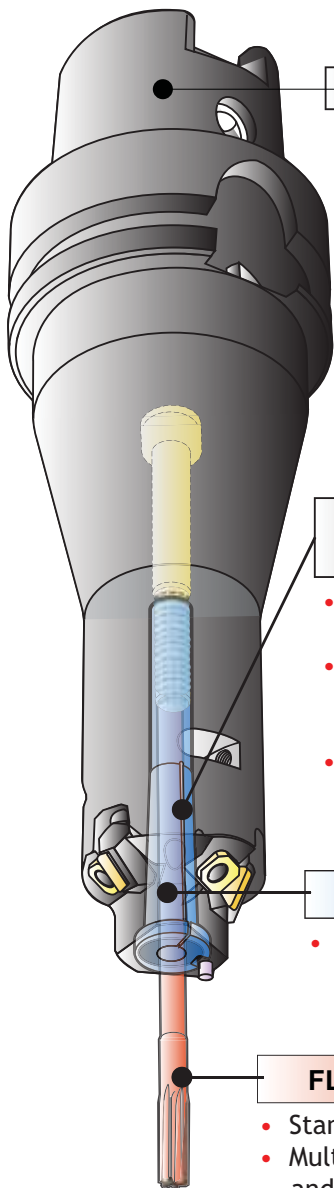
# HEAD TOOLING: Finish Valve Seat with Fixed Reamer and HSK

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**2.0 or Higher CPK's**  
on Multi-station Transfer  
lines or Dedicated CNC  
Machining Centers



*Reamer to valve seat cut concentricity is essential for leaker free valve seat cuts*



### HSK SHANK

- Provides repeatability within 0.000050"
- Available for manual or auto tool change

### VALVE SEAT TOOLING HEAD

- Carbide wedge eliminates chip wash
- Totally enclosed cartridge provides guaranteed accuracy on the angles
- No radial adjustment required

### REAMER COLLET

- Standard replaceable collet

### FLUTED REAMERS

- Standard fluted reamers
- Multiple lengths for roughing and finish operations

*Shank Dia and Collet Dia are Jig ground at 0.000 on tools centerline which ensures concentricity*



### COLLET



- Standard replaceable collet

### REAMER



- Standard fluted reamers
- Multiple length for roughing and finish operations

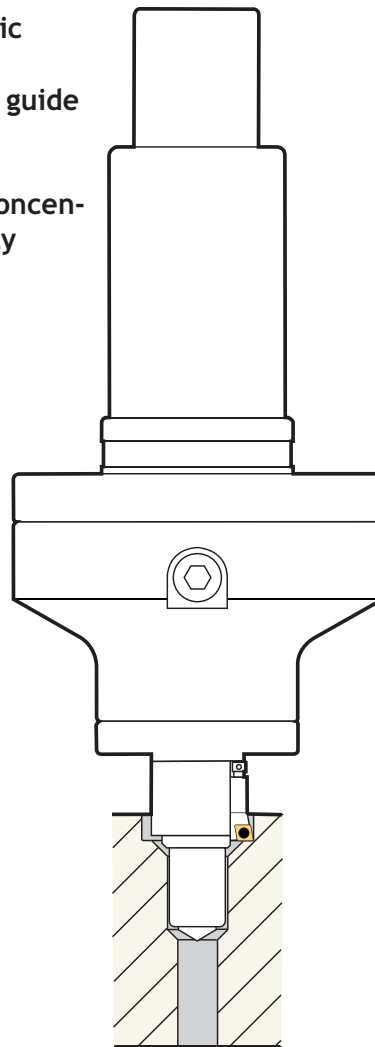
# HEAD TOOLING: Valve Throat Counterbore and Stem Bore

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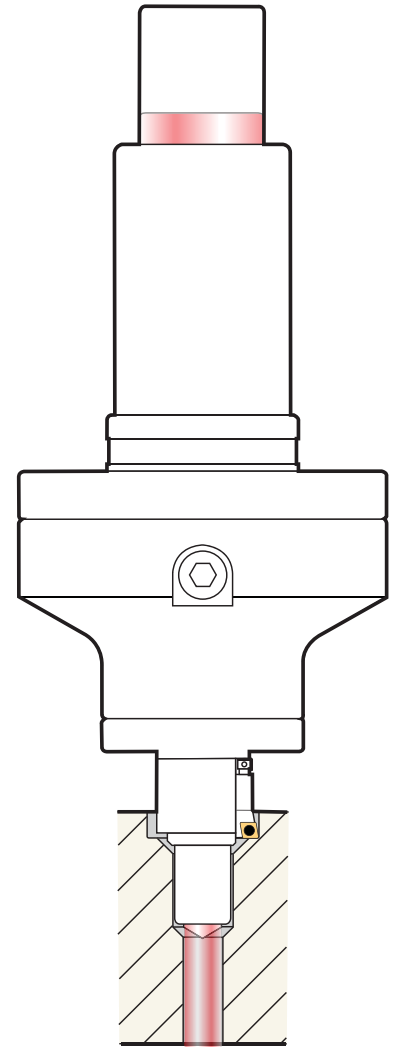


- Cartridge
- Wedge Screw

- Carbide bushing is jig ground concentric to tapered shank  
Ensures concentricity of stem to guide  
Improves reamer life
- MTK™ tapered shank ensures tooling concentricity along with .000050 repeatability
- ISO Standard inserts
- Offline presettable



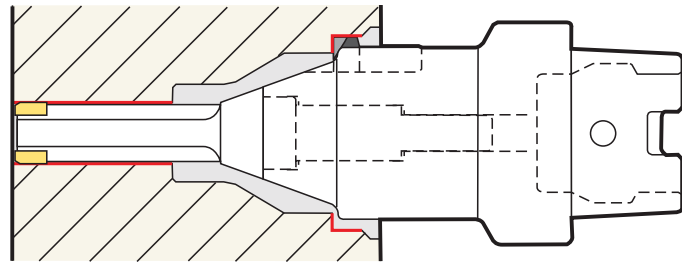
*Feed in and bore throat counterbore*



*Drawbar in and ream stem bore*

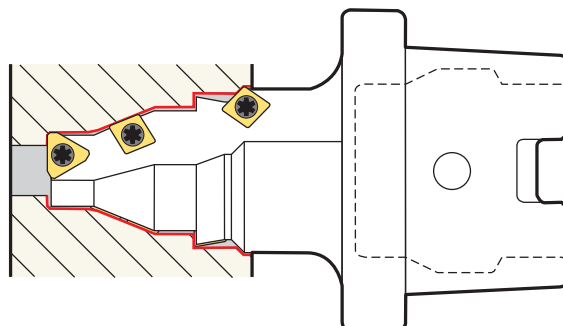
## Valve Seat Counterbore and Stem

- Brazed insert reamer
- Replaceable & indexable inserts
- Rough counterbore for valve seat
- HSK Shank for perfect concentricity
- Replaceable & indexable inserts
- Inserts arrayed to cover throat form
- Rough inserted counterbore for valve seat
- HSK Shank for perfect concentricity



## Rough and or Finish Valve Throat Bowl

- Replaceable & indexable inserts
- Fixed pocket inserts - no adjustment necessary
- Inserts arrayed to cover throat form
- Rough counterbore for valve seat
- HSK Shanks for excellent repeatability



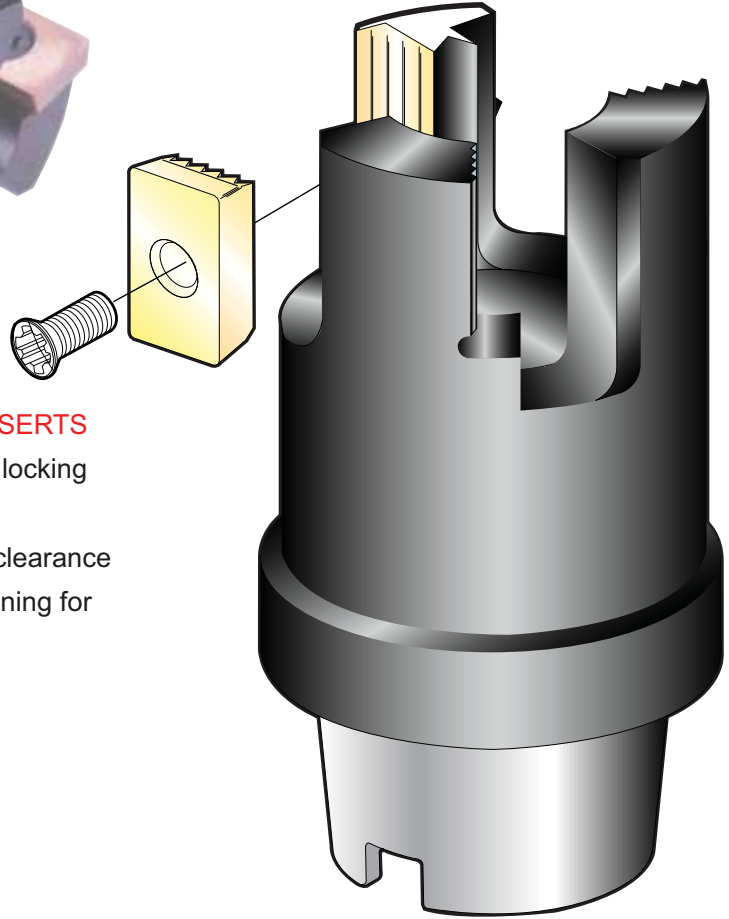
# HEAD TOOLING: Form Cut Spring Side, Tower and or Face

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V-Bottom style inserts with top clamps which wear out tool holder pockets quickly and tend to move in the cut under load

Top clamps which cause chip clearance problem

Quick change shanks other than HSK which causes low repeatability



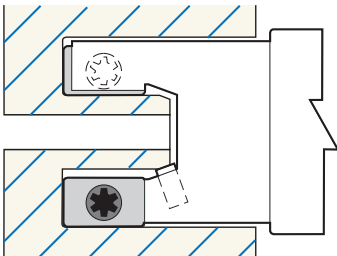
- **SERRATED SCREW DOWN INSERTS**  
 Provides positive location and locking  
 Inserts repeat within 0.001  
 No clamps for maximum chip clearance  
 Serrations provide rigid positioning for maximum tool life

• MANY INSERT FORMS AVAILABLE

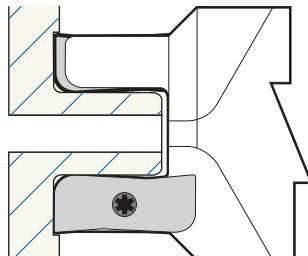
• QUICK CHANGE "HSK" SHANKS FOR REPEATABILITY

## Sample Cut Configurations

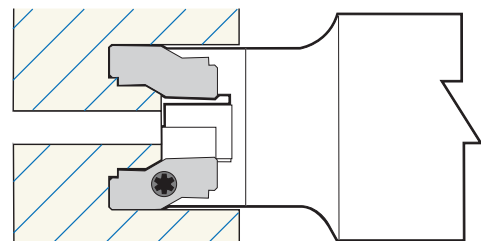
Seat, Tower, and Tower Chamfer



Seat and tower

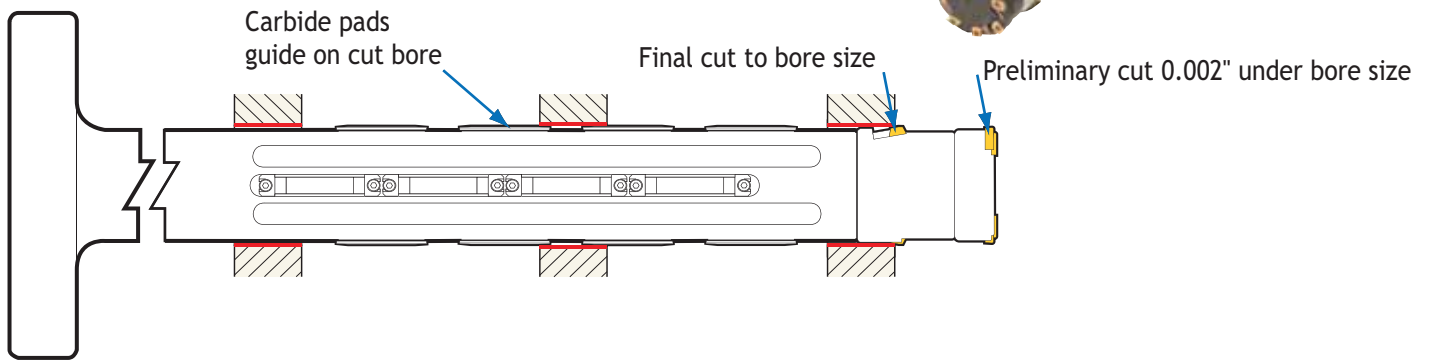


Seat, Tower and Tower Face

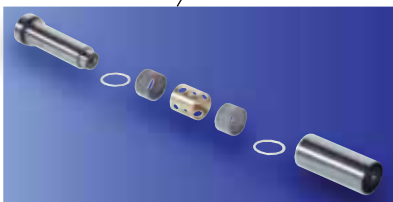
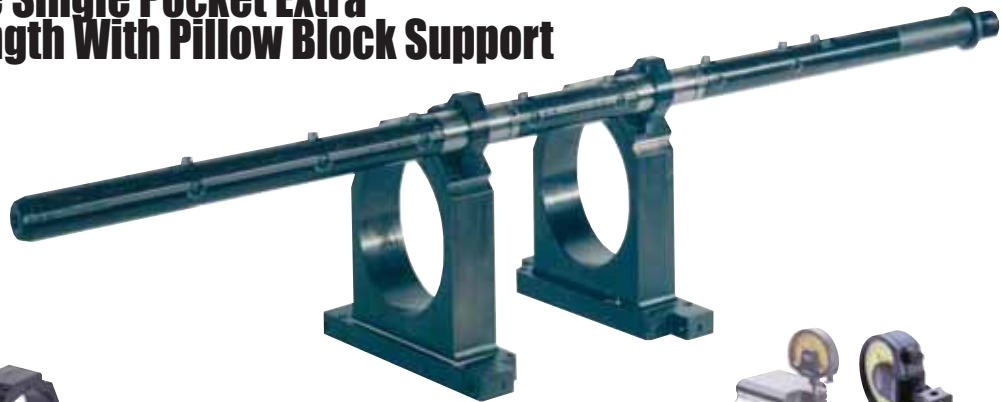


## Carbide Guided Fixed Pocket Rough Cam Bore

- *Quick Change Boring head with Pre-ground inserts*
- *Low profile screw down inserts for maximum chip clearance*
- *Coated or PCD tipped inserts for long tool life*

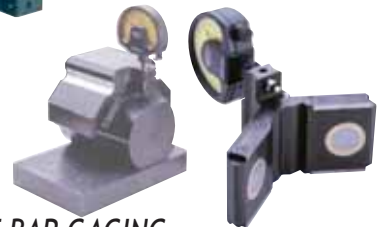


## Finish Bore Single Pocket Extra Length With Pillow Block Support



### MASTER TOOL DIVISION'S LINE BAR GAGING

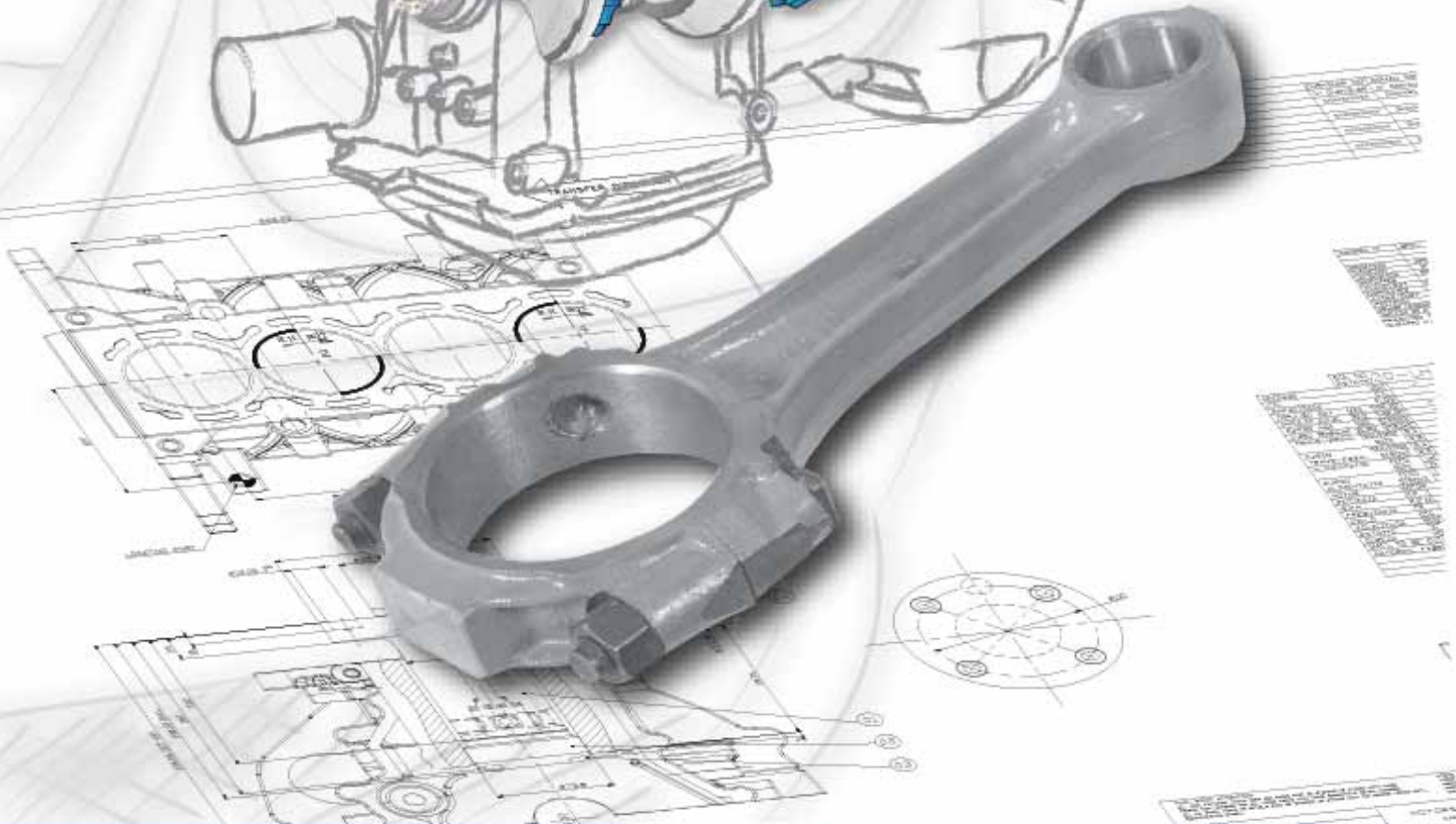
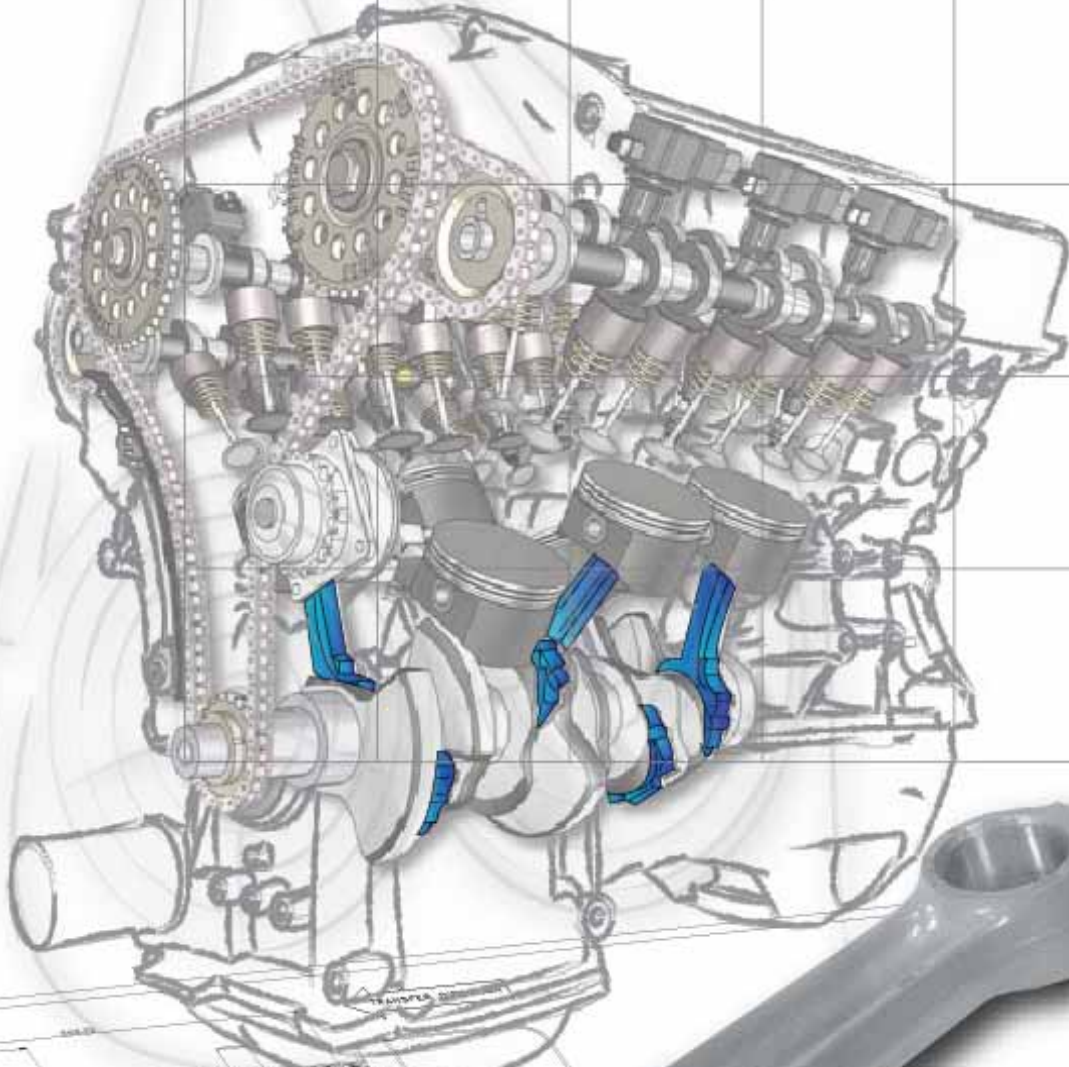
- *Magnetic Locking Base - ensures gage will stay in place*
- *Set master zero's indicator on the gage outside the machine*
- *Gage design positions against the cartridge for accurate positioning over the finishing insert*





# CONNECTING ROD

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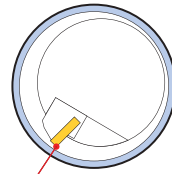


## Finish and Chamfer Crank Bore Generating Head



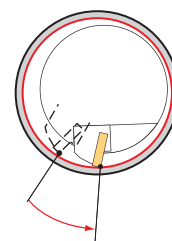
- **ZERO TOLERANCE - NO BACKLASH**
- **NO** Frictional (Rubbing) Wear
- **Balanced** thru the stroke
- Finish and Chamfer Crank bore in one operation
- Sealed and **AUTO-LUBE** Operation with proper maintenance Provides **5 YEAR PERFORMANCE** - Minimum

Feed Head Into Boring Position



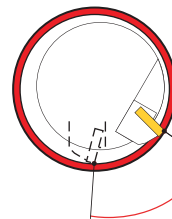
Feed Position

Stroke Draw Bar In and bore Diameter to Chamfer Position

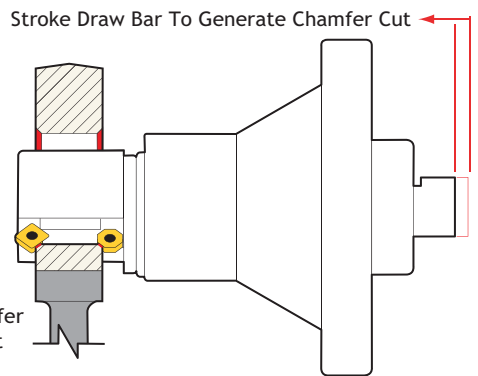
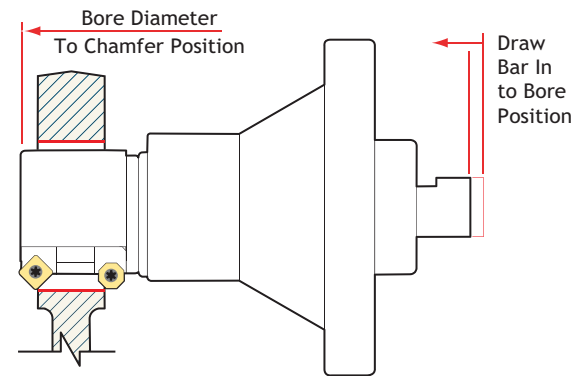
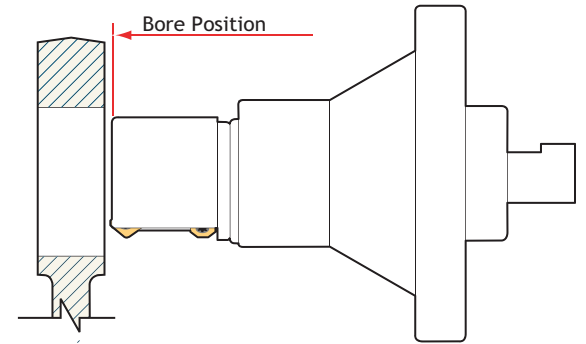


Bore Position

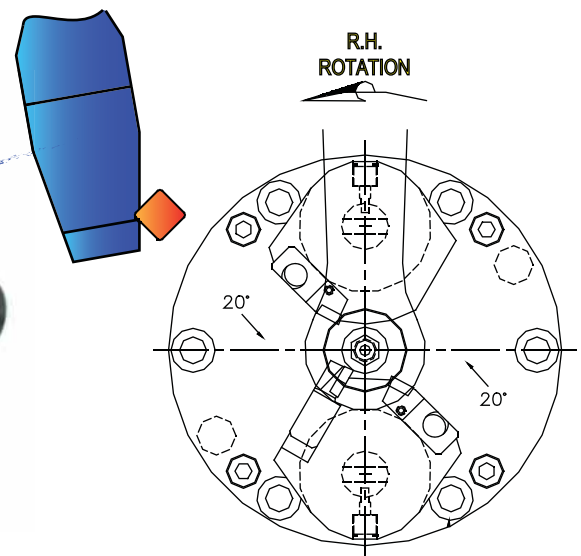
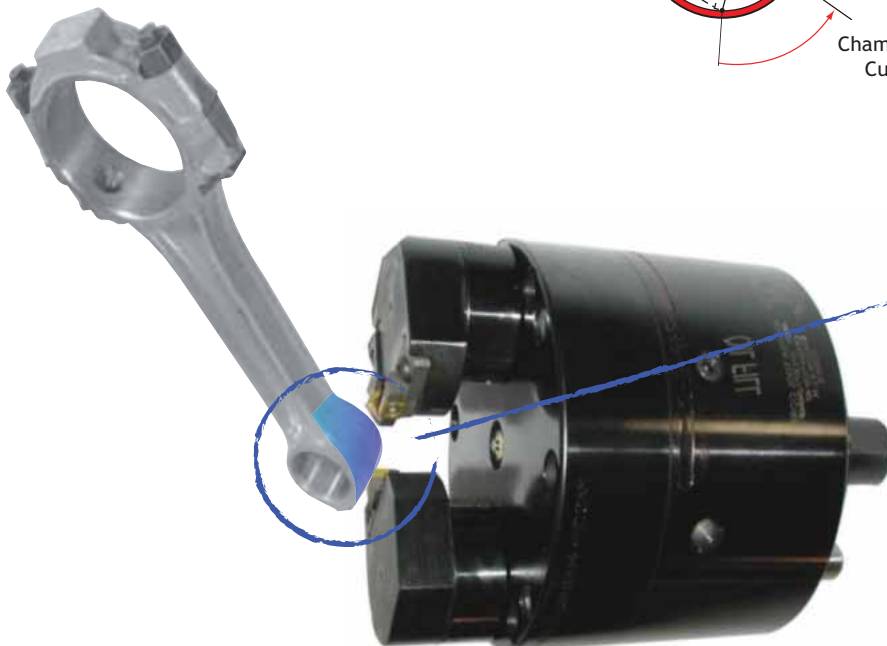
Generate Chamfer Cut



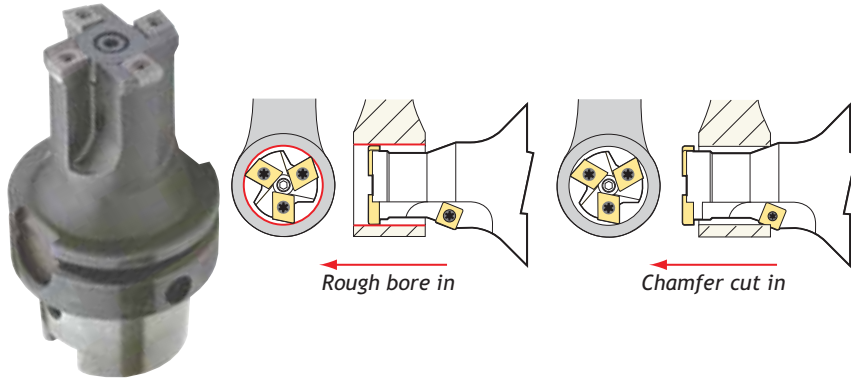
Chamfer Cut



## Tee-Pee Cutter

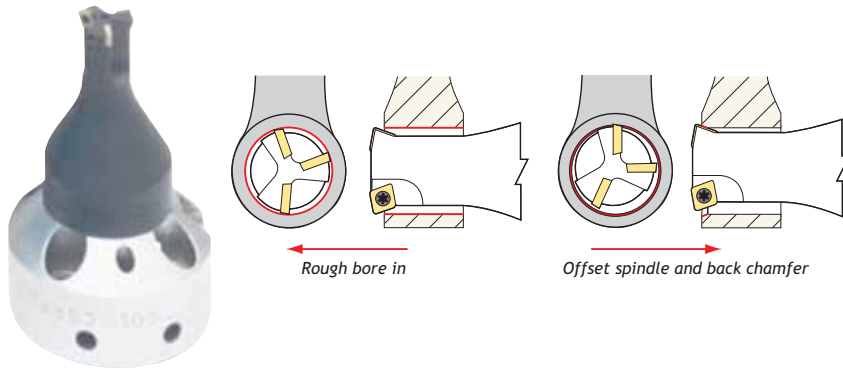


## Rough and Chamfer Pin Bore



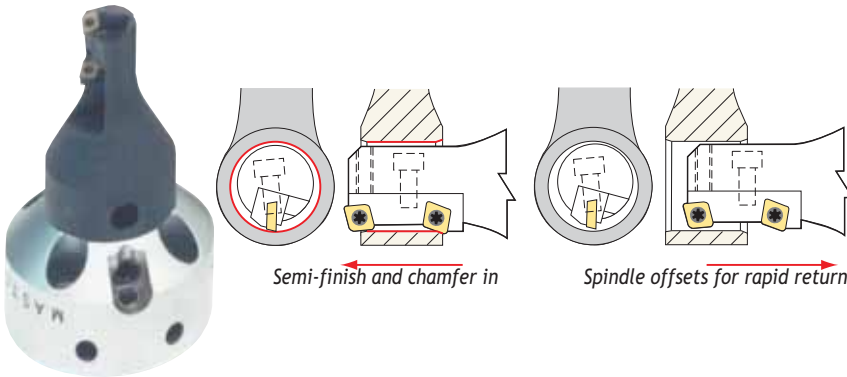
- Circle ground boring inserts
- Inserts located against internal carbide ring for perfect tracking
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Low profile screw down inserts for maximum chip clearance
- Coated or PCD tipped inserts for long tool life

## Rough Pin Bore and Back Chamfer - Eccentric Spindle



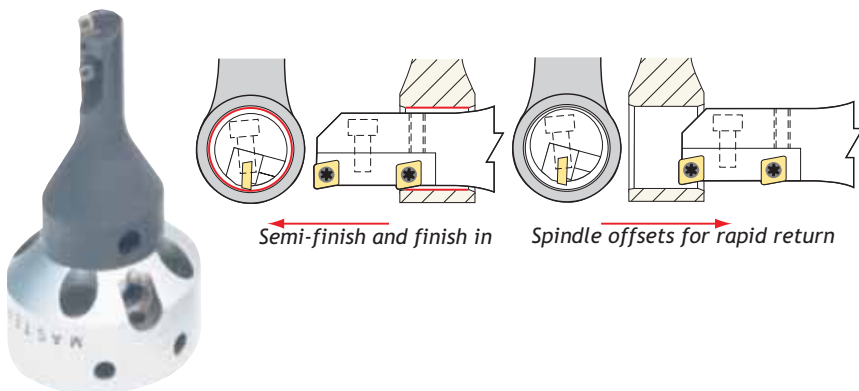
- ISO standard inserts
- Fixed pocket insert design tracks within .001
- No adjustment necessary
- HSK quick change shanks repeat within 0.000050 (.001 mm)

## Semi-Finish and Chamfer Pin Bore - Eccentric Spindle



- ISO standard inserts.
- Semi-Finish and chamfer on same stroke
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life

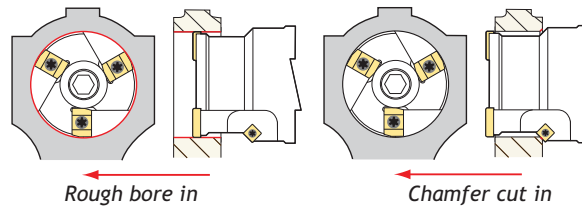
## Finish Pin Bore - Eccentric Spindle



- ISO standard inserts.
- Semi-Finish and finish on same stroke to ensure size and quality.
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life

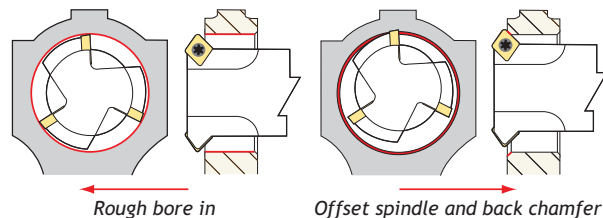
## Rough and Chamfer Crank Bore

- Circle ground boring inserts
- Inserts located against internal carbide ring for perfect tracking
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Low profile screw down inserts for maximum chip clearance
- Coated or PCD tipped inserts for long tool life



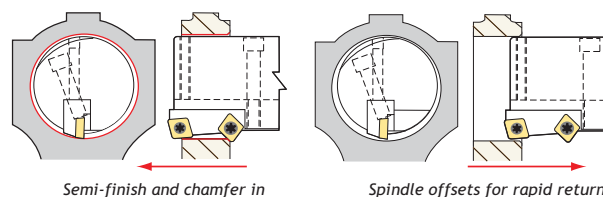
## Rough Crank Bore and Back Chamfer - Eccentric Spindle

- ISO standard inserts
- Fixed pocket insert design tracks within .001
- No adjustment necessary
- HSK quick change shanks repeat within 0.000050 (.001 mm)



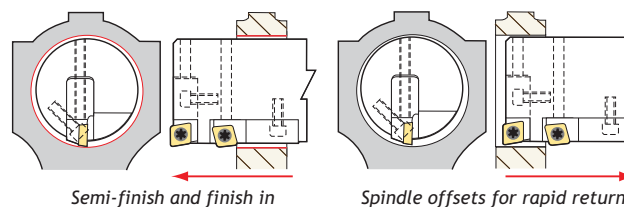
## Semi-Finish and Chamfer Crank Bore - Eccentric Spindle

- ISO standard inserts.
- Semi-Finish and chamfer on same stroke
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life



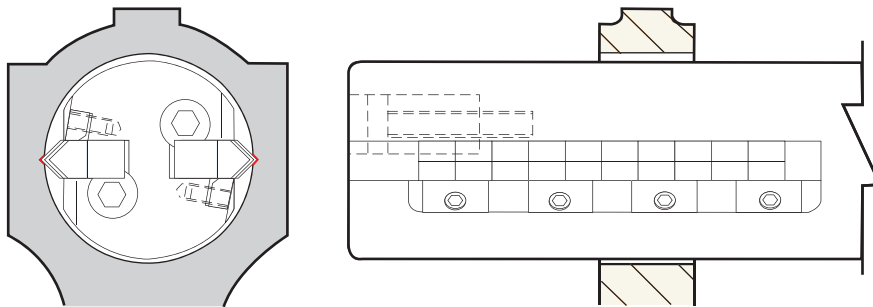
## Finish Crank Bore - Eccentric Spindle

- ISO standard inserts.
- Semi-Finish and finish on same stroke to ensure size and quality.
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for long tool life



## V-Notch Cutter for Cracking

- ISO standard inserts.
- Semi-Finish and chamfer on same stroke
- HSK quick change shanks repeat within 0.000050 (0.001 mm)
- Coated or PCD tipped inserts for long tool life



## Connecting Rod Weight Mill

### MASTER TOOL DIVISION'S

Two piece construction with adapter and aluminum bodied milling cutter reduces weight for easy cutter change.

- Replaceable cartridges lowers tool replacement costs
- ISO standard inserts



One bolt mounting for easy on and off

Round insert and cartridge design reduces decibel level to

**70db!**

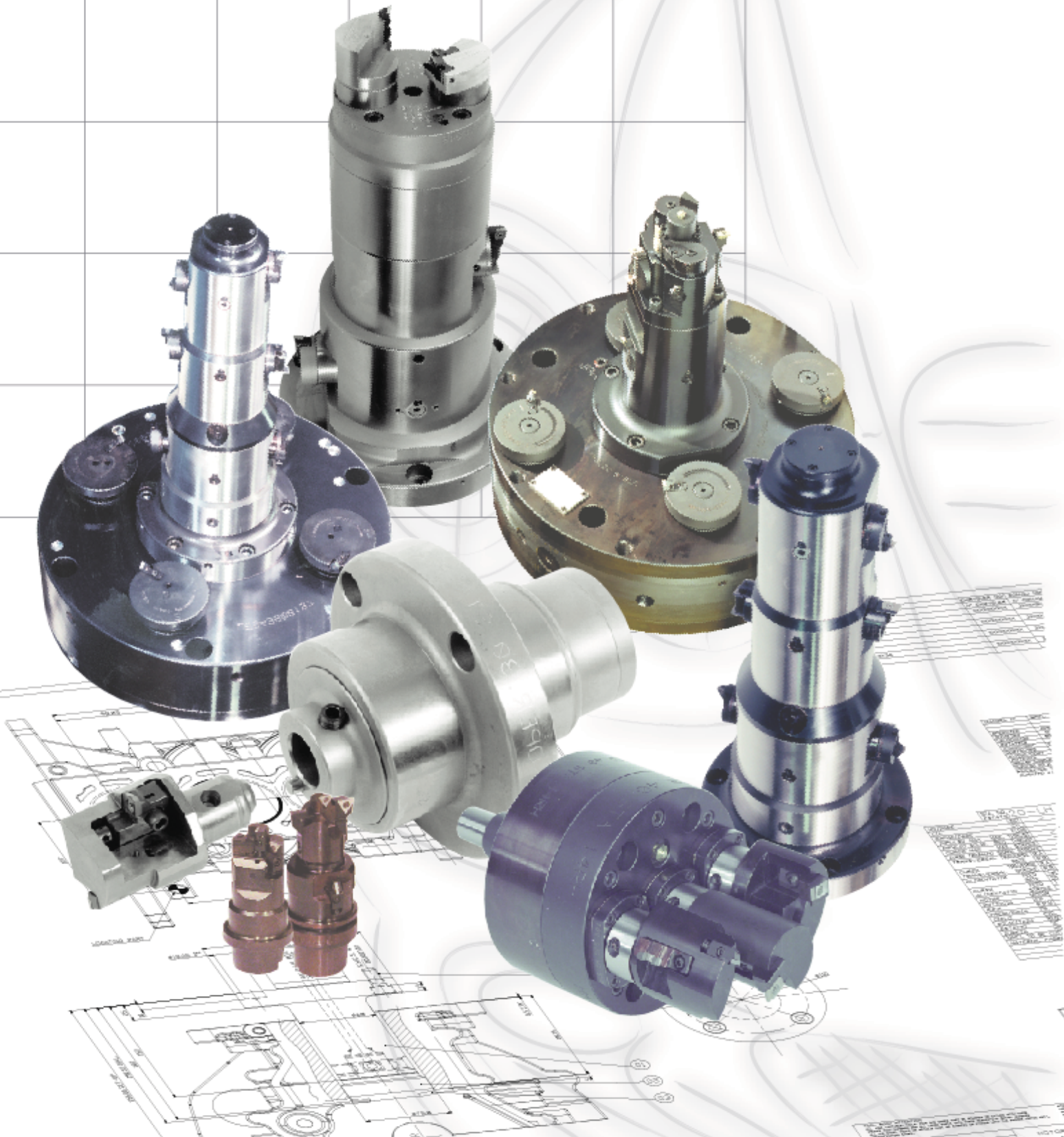


ADAPTER

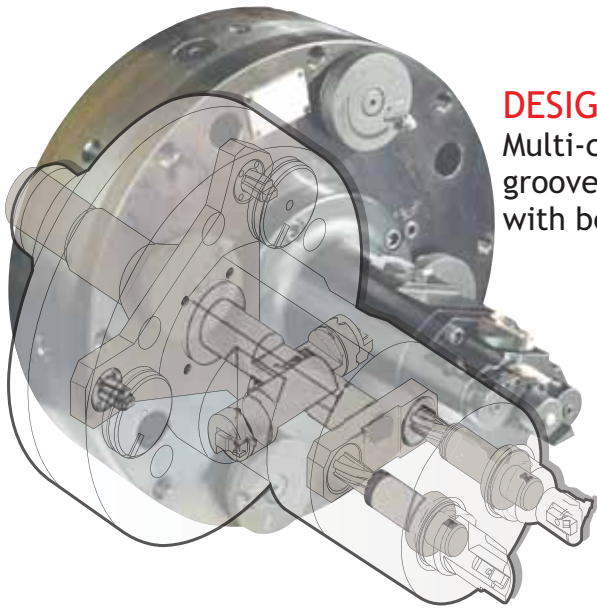


# TRANSMISSION

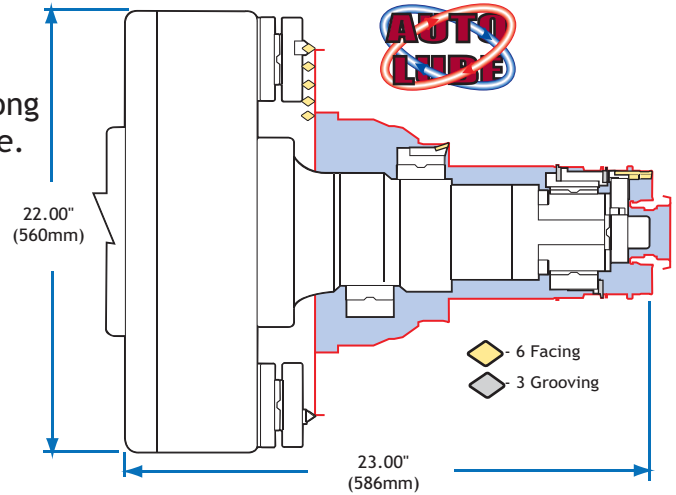
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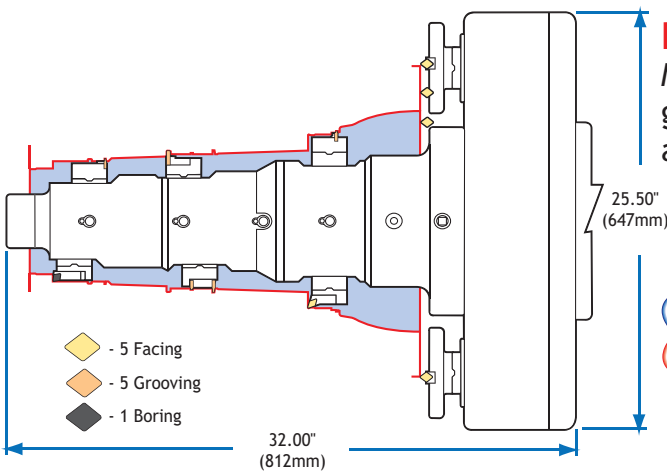
## Helical Spline Plate Driven Serrated Rack and Rotary Front



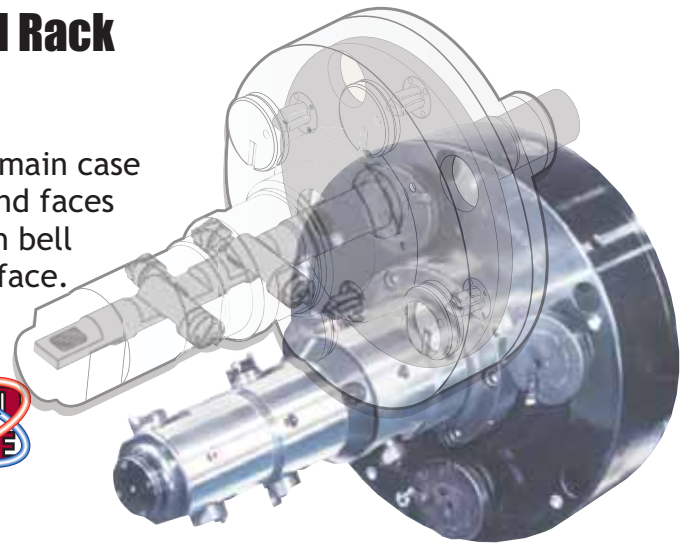
**DESIGN:**  
Multi-cut main case grooves and faces along with bell housing face.



## Helical Spline Plate Driven and Serrated Rack

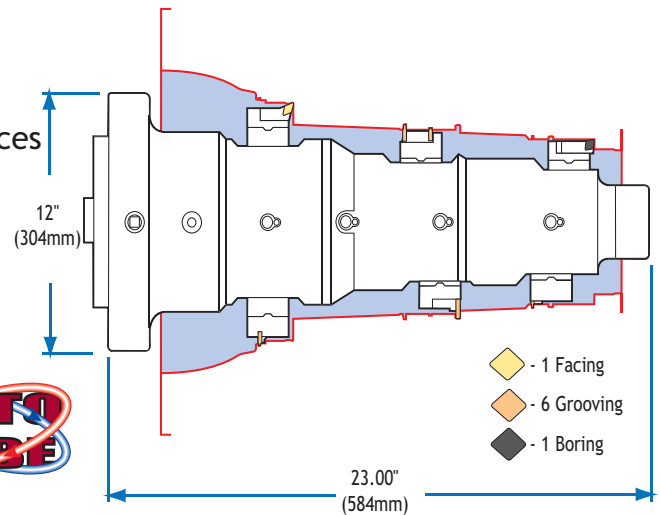
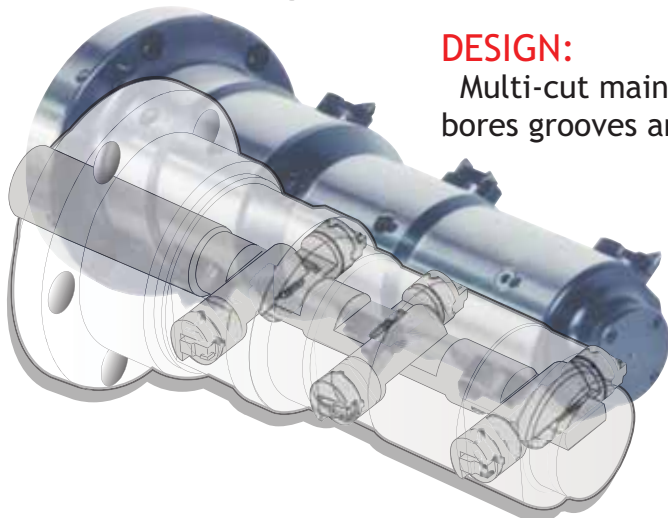


**DESIGN:**  
Multi-cut main case grooves and faces along with bell housing face.

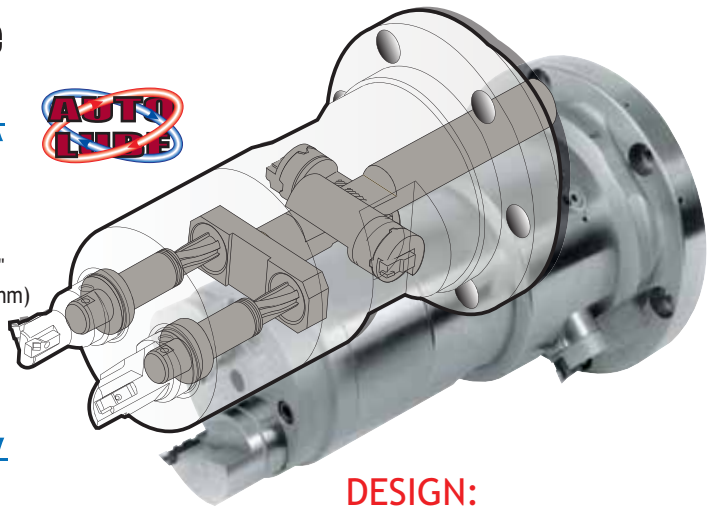
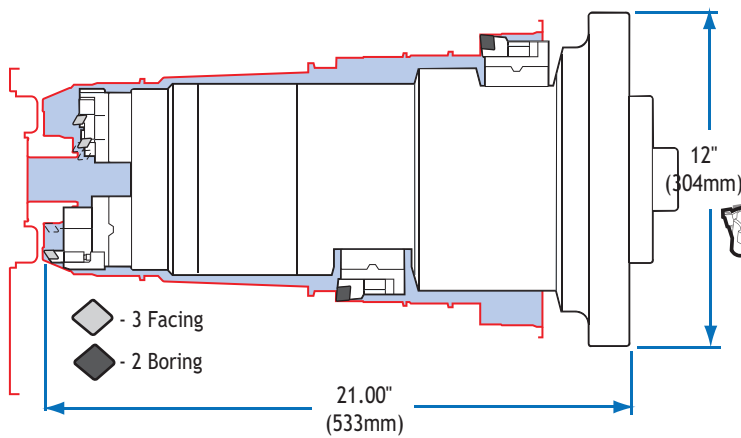


## Serrated Rack

**DESIGN:**  
Multi-cut main case bores grooves and or faces

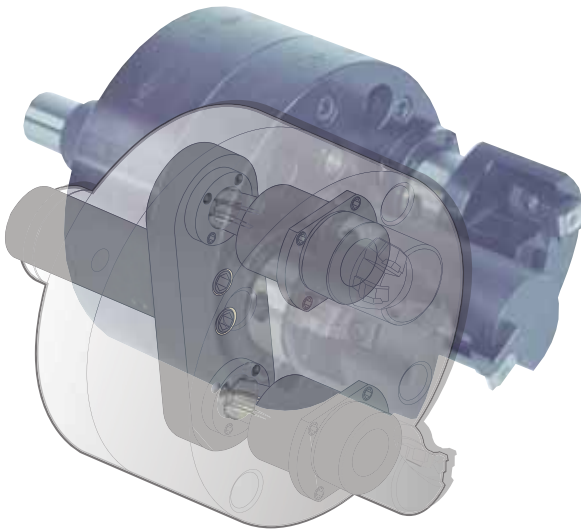


## Serrated Rack and Helical Plate

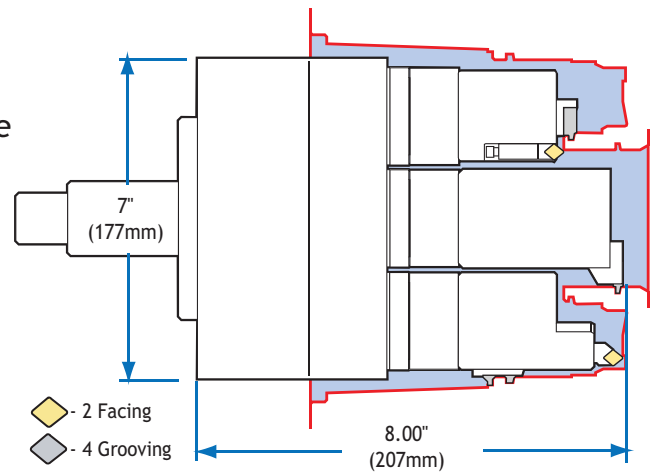


**DESIGN:**  
Multi-cut main case bores, grooves and faces

## Plate Driven Helical Spline



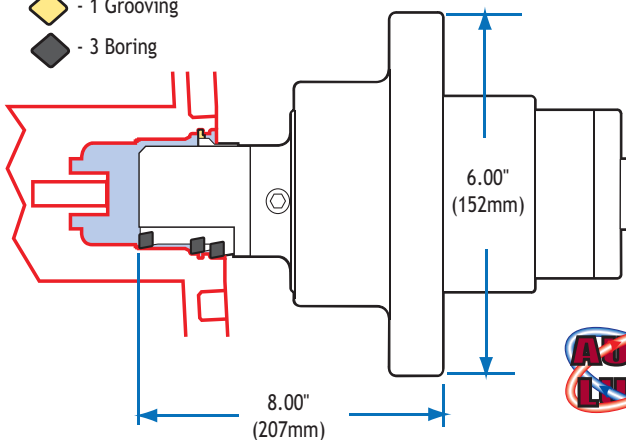
**DESIGN:**  
Multi-cut case grooves and faces



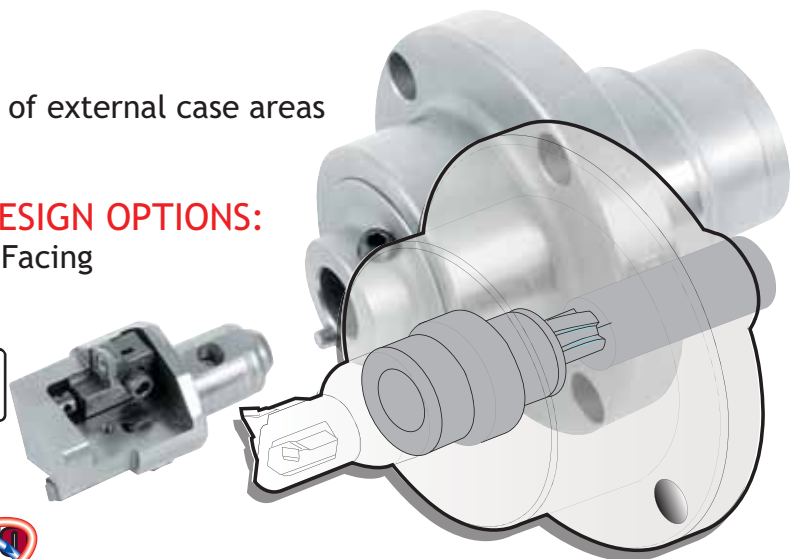
## Helical Spline Driven

**DESIGN:**  
Multi-cut grooving and boring of external case areas such as servo-bore

- 1 Grooving
- 3 Boring



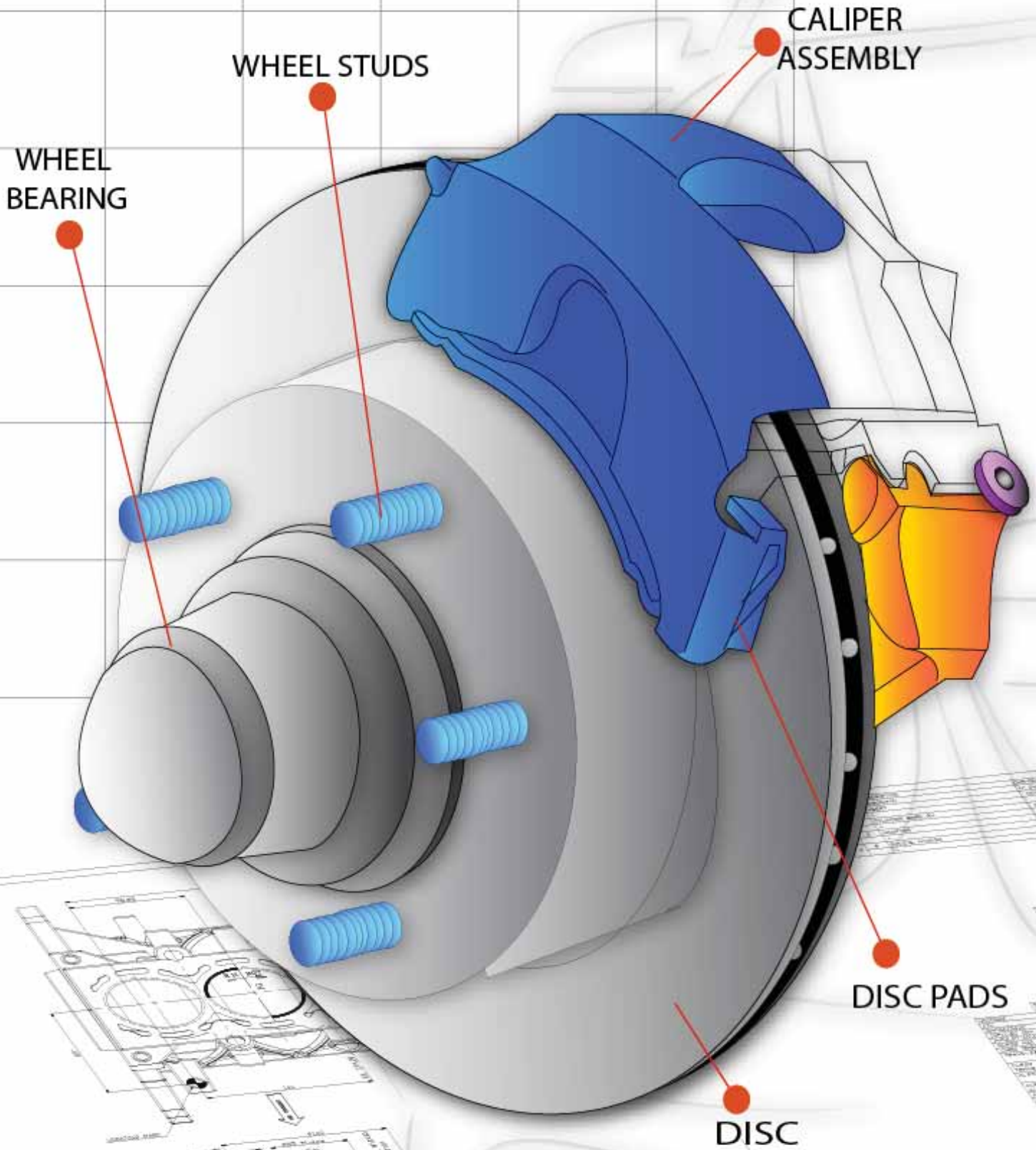
**DESIGN OPTIONS:**  
Facing



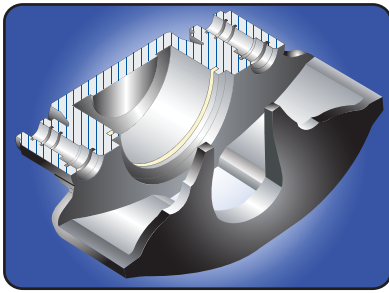


# BRAKE CALIPER

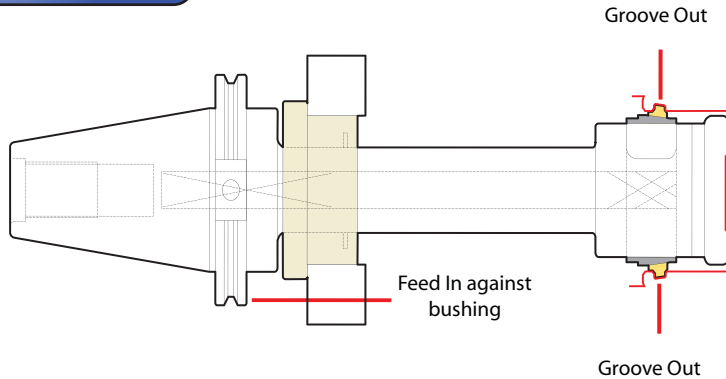
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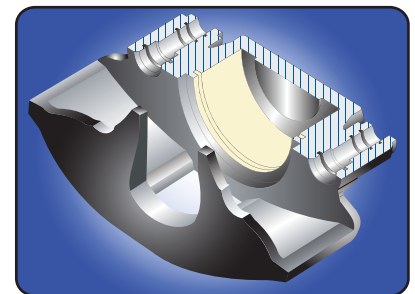
## Seal Groove Generating Head



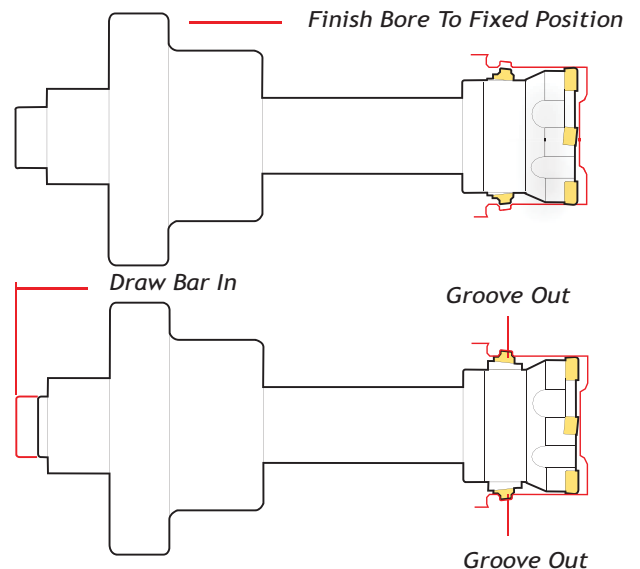
- Serrated Rack:  
*allows for ZERO TOLERANCE - NO BACKLASH*  
*Maintains balance at RPM through the feed cycle*
- **NO Frictional (Rubbing) Wear**
- *Balanced thru the stroke*



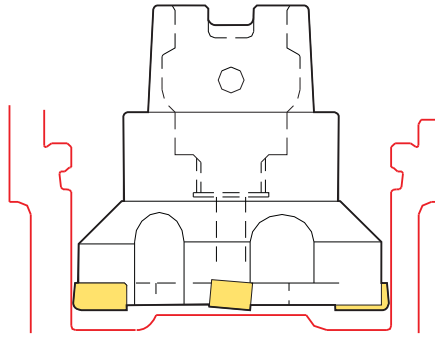
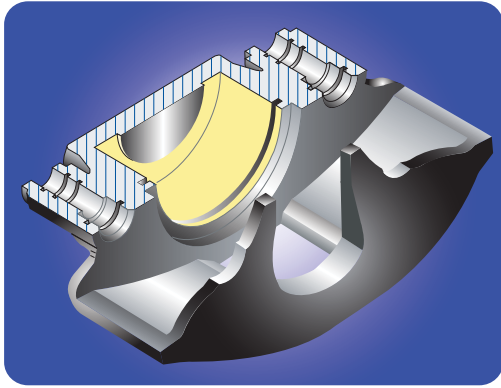
## Finish Bore and Seal Groove Generating Head



- Serrated Rack:  
*allows for ZERO TOLERANCE - NO BACKLASH*  
*Maintains balance at RPM through the feed cycle with:*
- **NO Frictional (Rubbing) Wear**
- *Balanced thru the stroke*
- *Sealed and AUTO-LUBE Operation with proper maintenance.*  
*Provides 5 YEAR PERFORMANCE - Minimum*

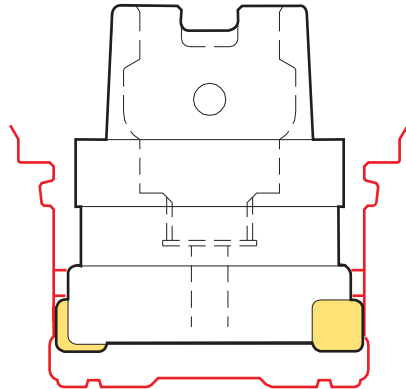
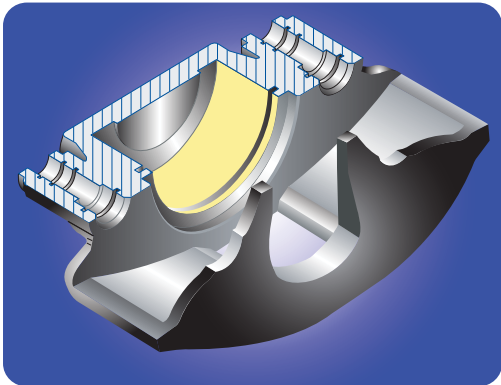


## Rough Piston Bore



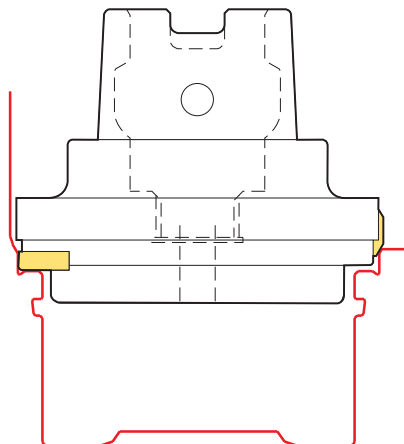
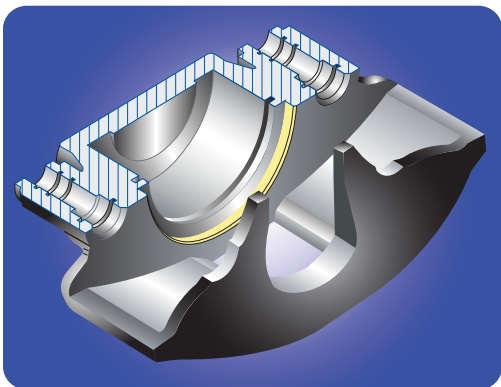
- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

## Finish Piston Bore



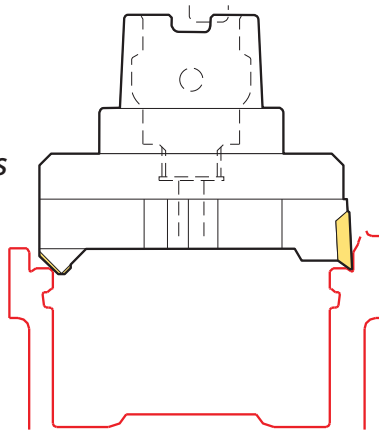
- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

## Rough Boot Seal

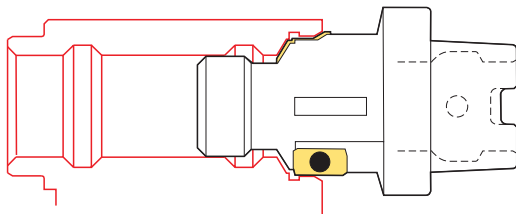
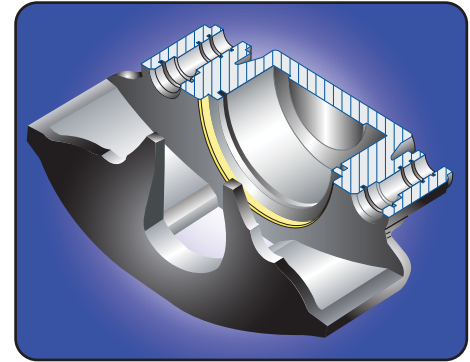


- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

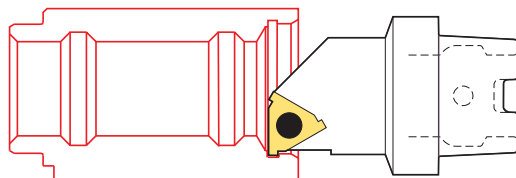
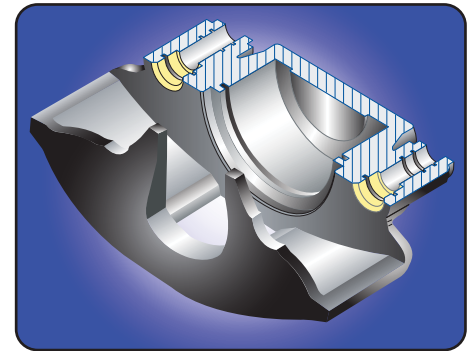


## Finish Boot Seal



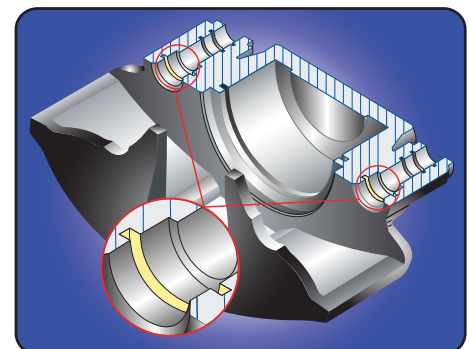
- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

## Pin Bore Seal Counterbore

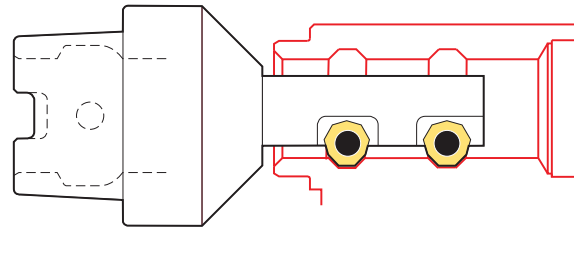
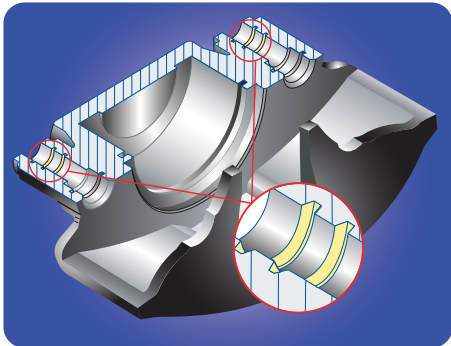


- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

## Pin Bore Seal Undercut

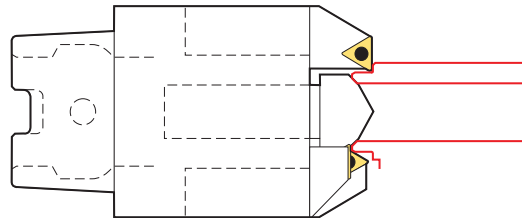
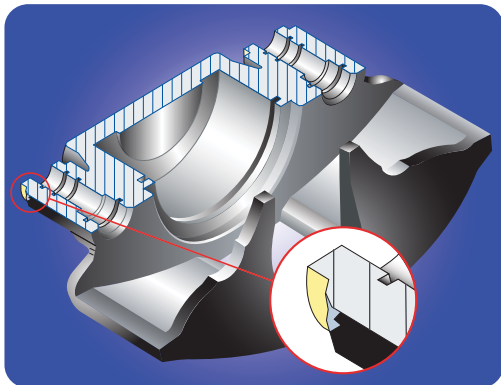


## Pin Bore O-Ring Groove



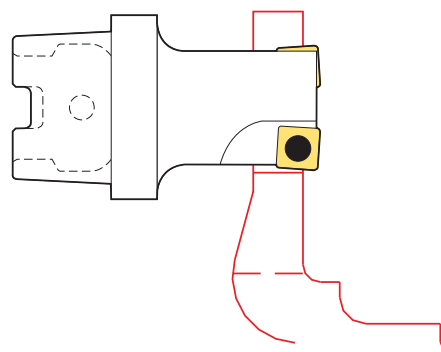
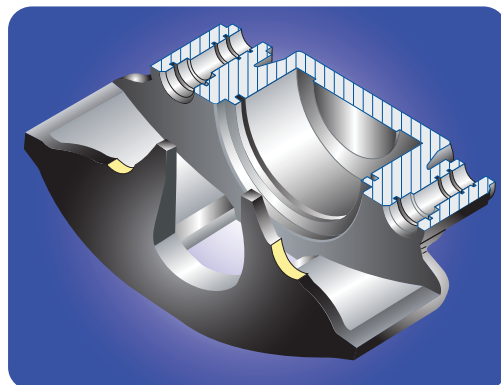
- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

## Caliper Guide Pin



- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life

## Pin Bore Tool Clearance Slot



- ISO standard inserts
- HSK quick change shanks repeat within 0.000050 (.001 mm)
- Coated or PCD tipped inserts for longer tool life



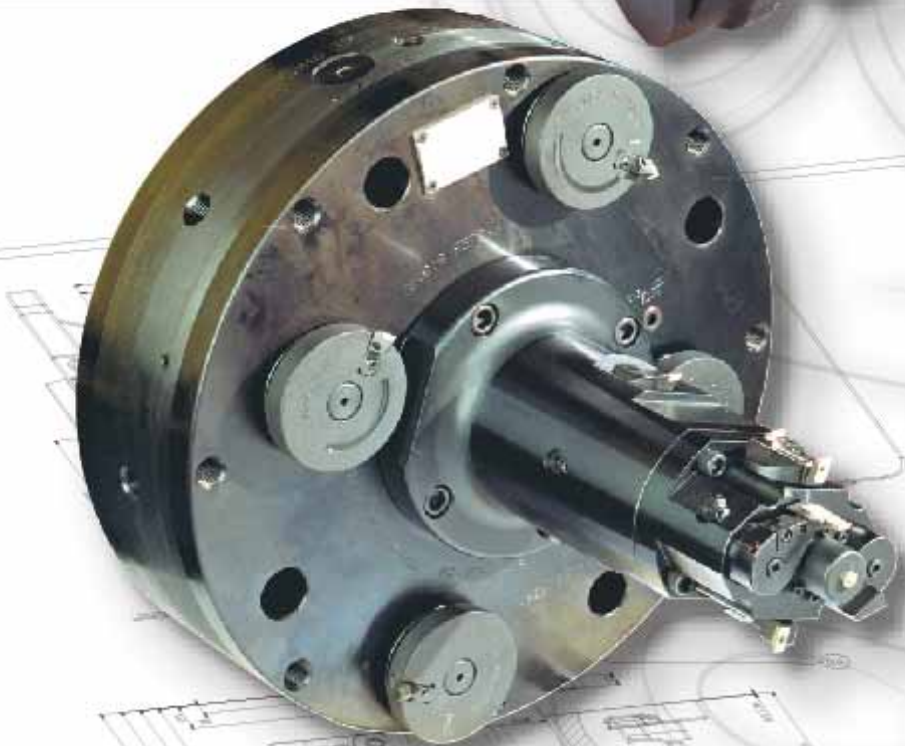
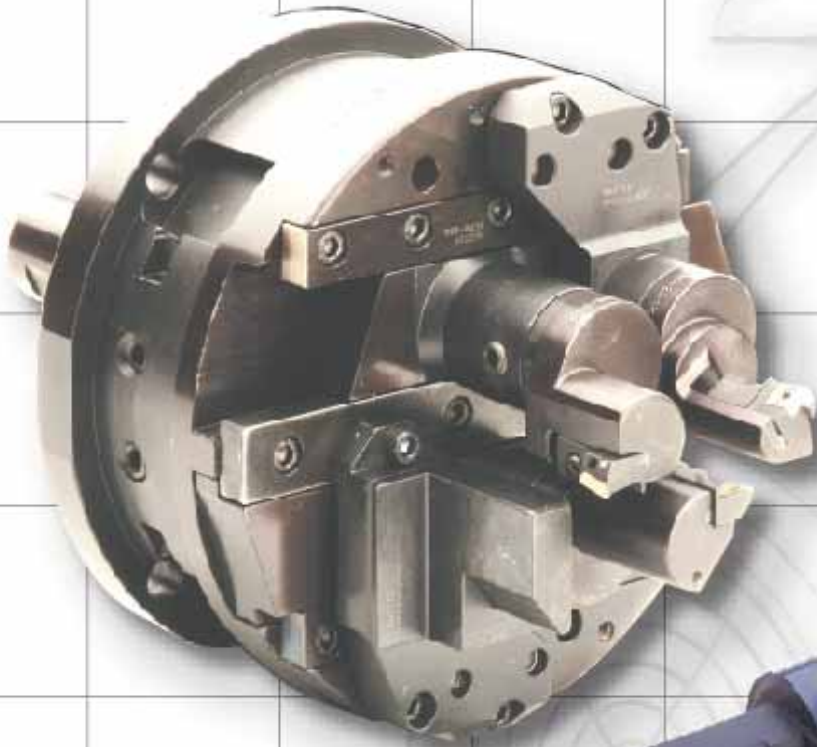
# PINION VALVE

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# GENERATING HEADS

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## MASTER TOOL'S

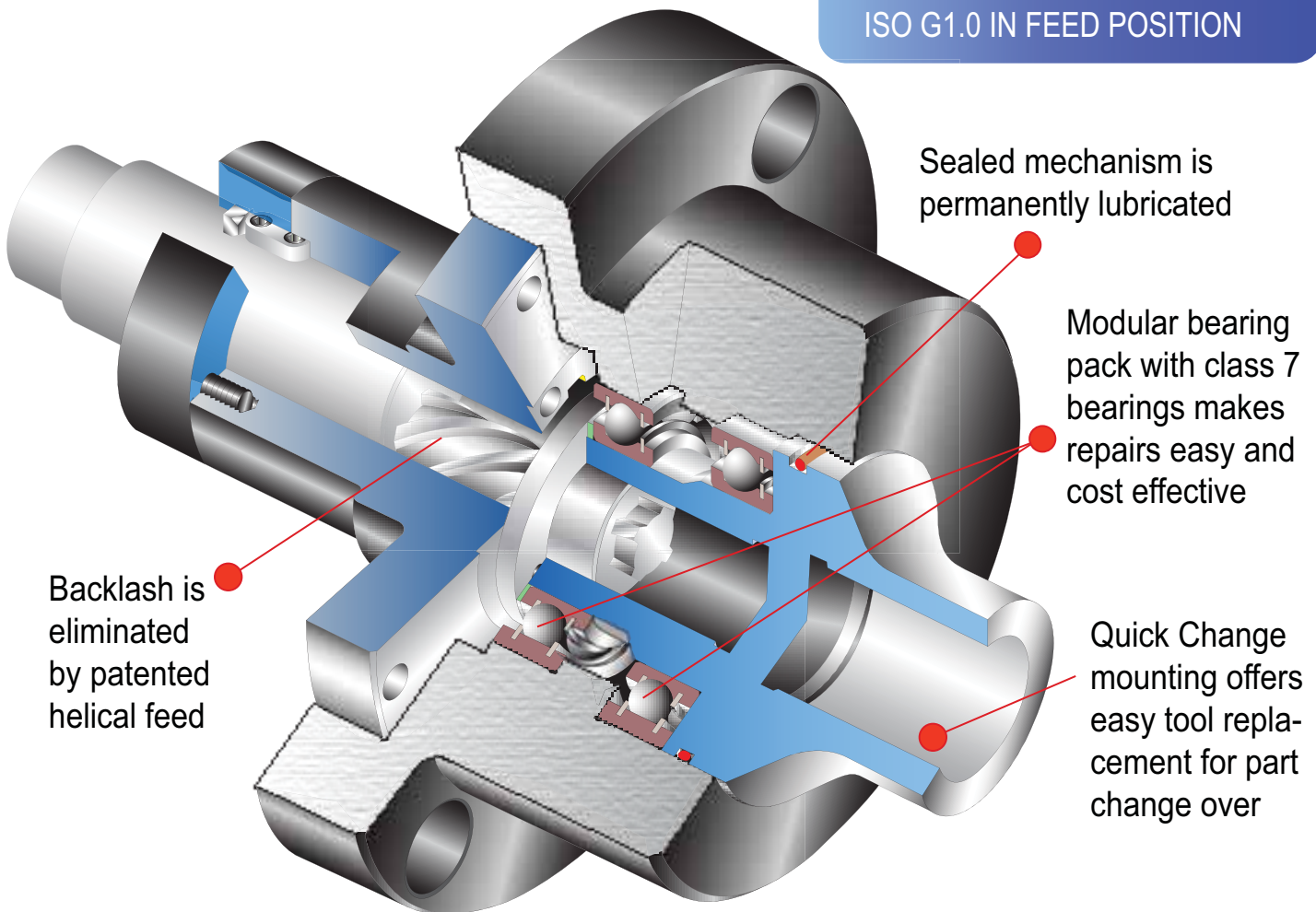


**PATENTED** Helical Spline design maintains balance at RPM through the feed cycle with **ZERO** backlash

- \* **ZERO TOLERANCE - NO BACKLASH**
- \* **NO** Frictional (Rubbing) Wear
- \* **BALANCED** thru the stroke
- \* **PRESETTABLE "QUICK CHANGE"** Cutting Heads
- \* Sealed and **AUTO-LUBE** Operation with proper maintenance provides **5 YEAR PERFORMANCE** Minimum

### BALANCE AT RPM

ISO G.04 IN RETRACT POSITION  
ISO G1.0 IN FEED POSITION



Backlash is eliminated by patented helical feed

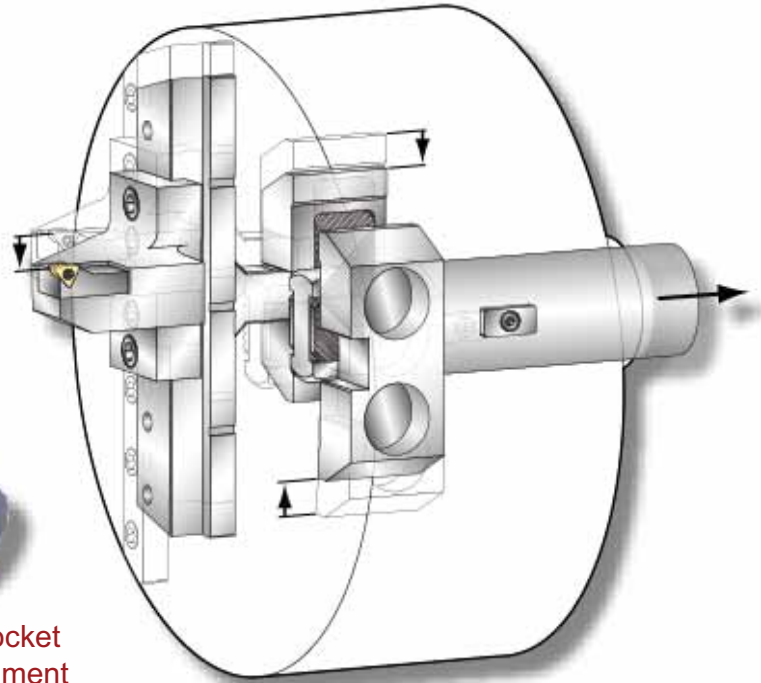
Sealed mechanism is permanently lubricated

Modular bearing pack with class 7 bearings makes repairs easy and cost effective

Quick Change mounting offers easy tool replacement for part change over

## RECOMMENDED DESIGNS

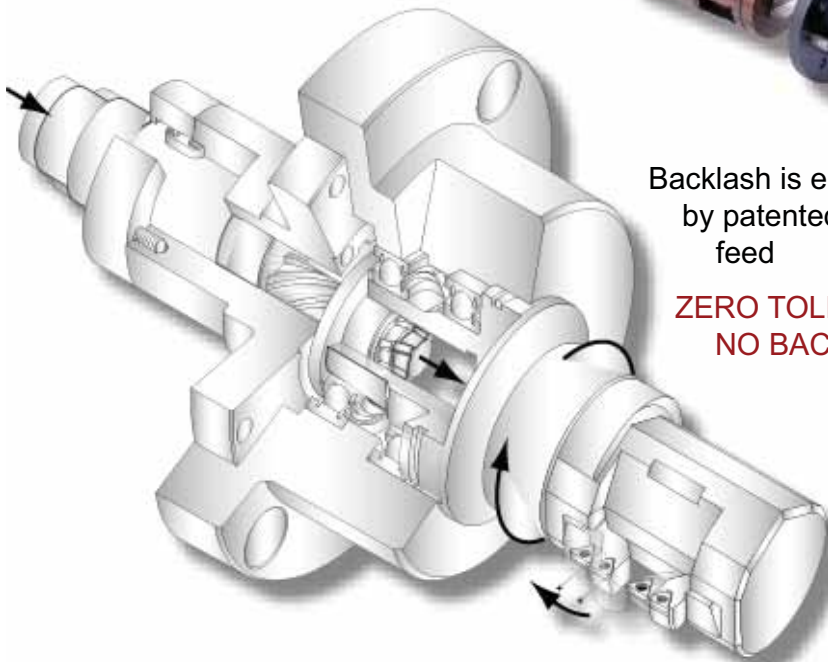
# SERRATED RACK



Jig Ground Serrated Pad  
allows for interchangeability  
Enables it to be field  
replaceable  
Provides uniformity of cut  
over greater distances

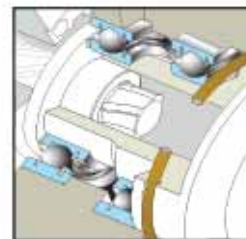
Precision Ground Pocket  
Precise Fit and Alignment  
Round draw bar design  
enables sealing of the head

# ROTARY SPLINE



Backlash is eliminated  
by patented helical  
feed

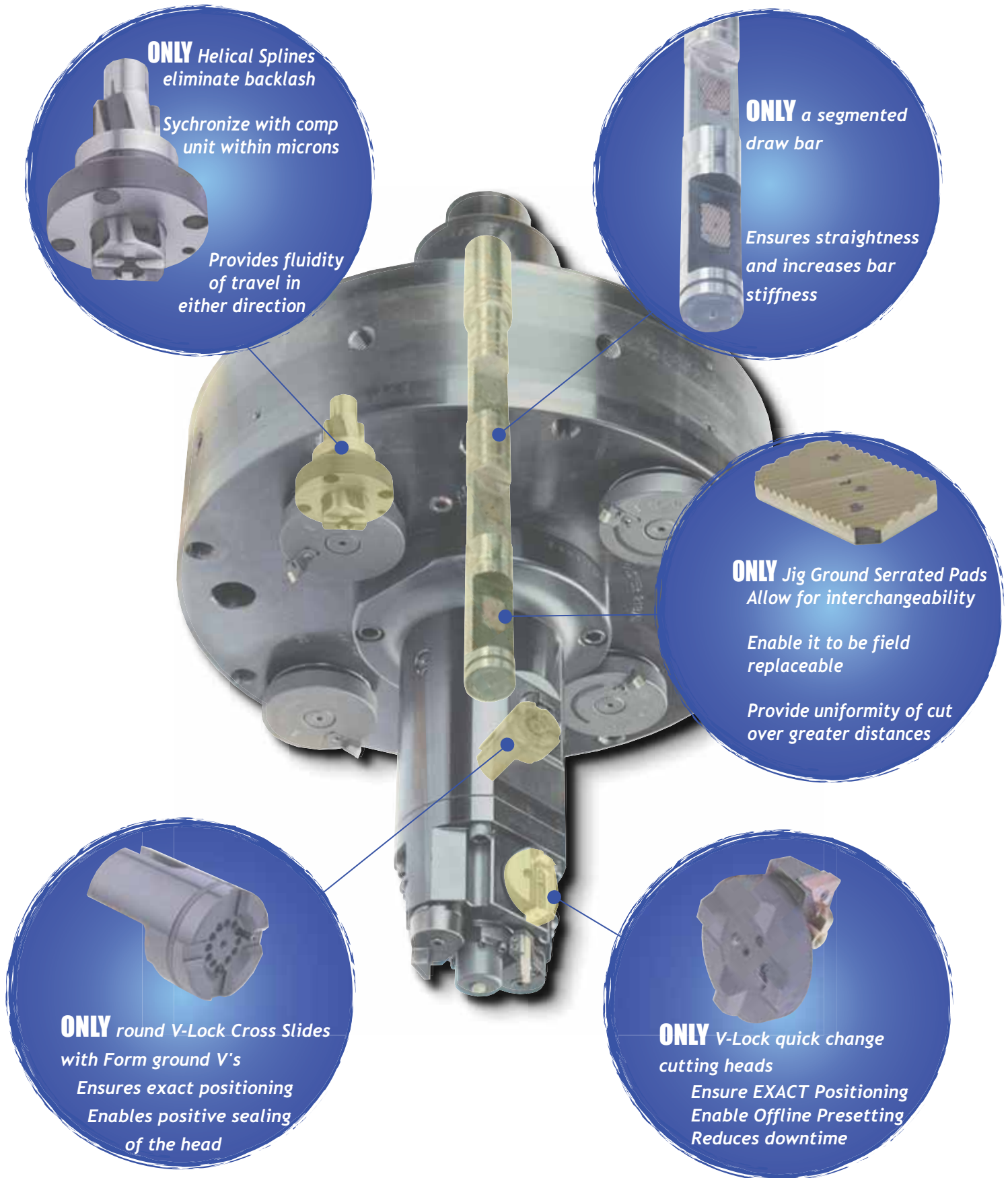
**ZERO TOLERANCE -  
NO BACKLASH**



Modular bearing  
pack with class 7  
bearings makes  
repairs easy & cost  
effective

Sealed mechanism  
is permanently  
lubricated

## NO FIT AT ASSEMBLY REQUIRED



# ADAPTERS

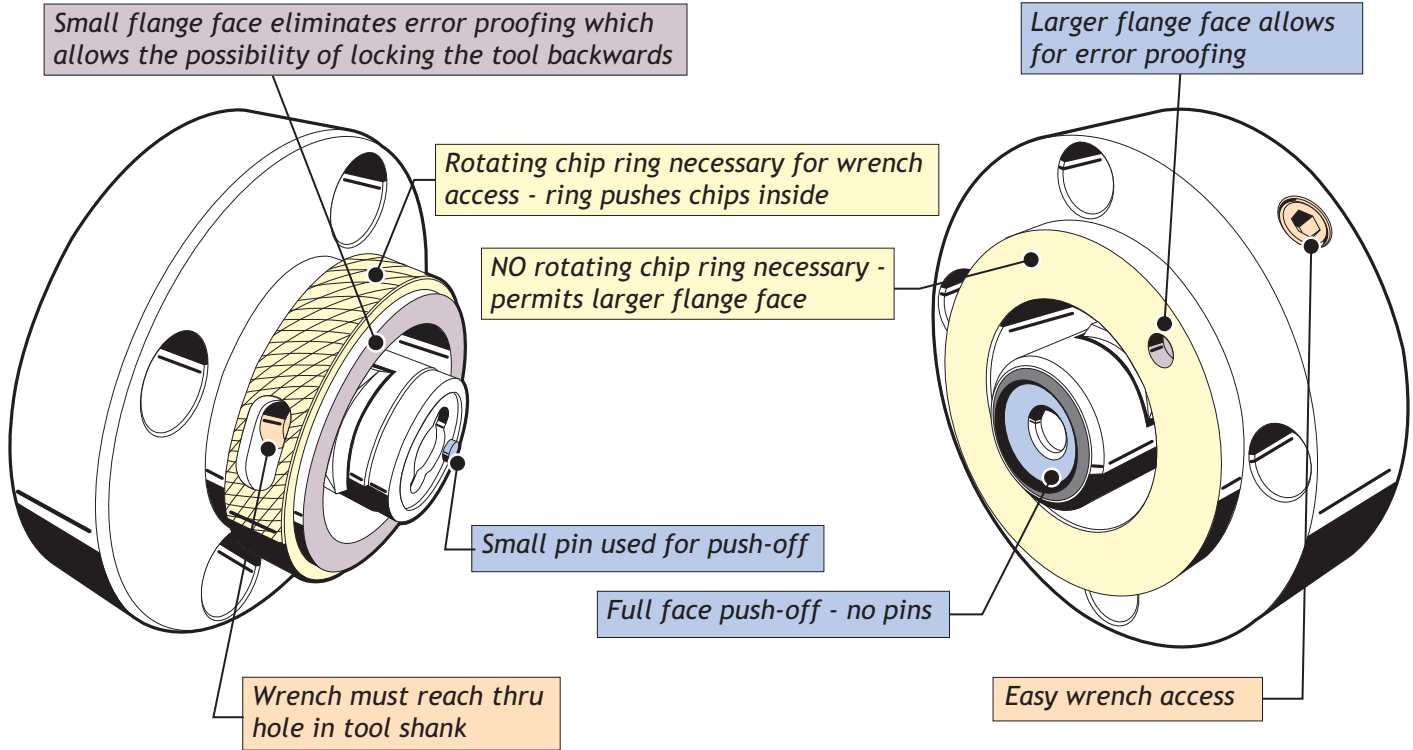
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## MASTER TOOL DIVISION'S DIFFERENCE

### COMPETITORS DESIGN

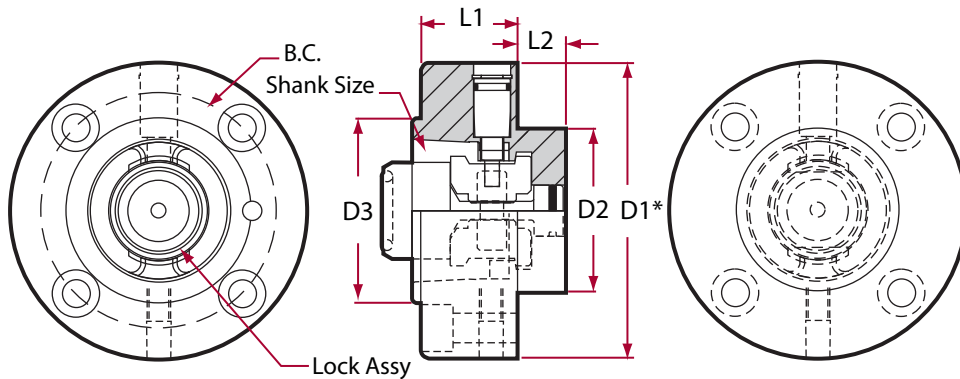
### MASTER TOOL DIVISION'S DESIGN



\* No access to remove locked tool

\* Lock activated thru key - not the hole in the shank

\* Access location to remove locked tool



| PART No. | SHANK SIZE | B.C.            | D1 (MIN)        | D2             | D3             | L1             | L2             | BOLT SIZE | LOCK ASSY |
|----------|------------|-----------------|-----------------|----------------|----------------|----------------|----------------|-----------|-----------|
| AHK32-*  | HSKK32     | 1.61<br>(40.8)  | 1.97<br>(50)    | 1.1<br>(27.9)  | 1.26<br>(32)   | 0.75<br>(19)   | 0.67<br>(17)   | M4        | HKL30     |
| AHK40-*  | HSK40      | 1.97<br>(50)    | 2.48<br>(62.9)  | 1.37<br>(34.7) | 1.57<br>(39.8) | 0.91<br>(23.1) | 0.67<br>(17)   | M5        | HKL38     |
| AHK50-*  | HSK50      | 2.38<br>(60.4)  | 3.15<br>(80.1)  | 1.5<br>(38.1)  | 1.97<br>(50)   | 1.1<br>(27.9)  | 0.75<br>(19)   | M6        | HKL48     |
| AHK63-*  | HSK63      | 3.15<br>(80.1)  | 3.97<br>(100.8) | 2.2<br>(55.8)  | 2.48<br>(62.9) | 1.38<br>(35)   | 0.91<br>(23.1) | M8        | HKL60     |
| AHK80-*  | HSK80      | 4.25<br>(107.9) | 5<br>(127)      | 2.99<br>(75.9) | 3.15<br>(80.1) | 1.44<br>(36.5) | 1.5<br>(38.1)  | M8        | HKL83     |
| AHK100-* | HSK100     | 4.72<br>(119.8) | 5.5<br>(139.7)  | 2.99<br>(75.9) | 3.94<br>(100)  | 1.62<br>(41.1) | 1.5<br>(38.1)  | M10       | HKL100    |

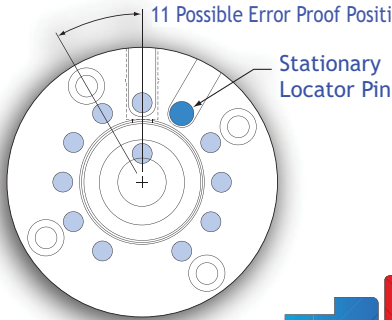
**Master Tool Division's** NWH shank system incorporates existing HSK taper and locking technology while offering error proofing capabilities not available with HSK.

## The Master Tool Division Difference....

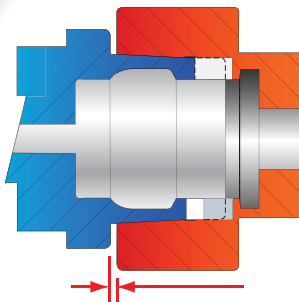
- \* Lock activated thru key - NOT the hole in the shank
- \* Access location to remove locked tool



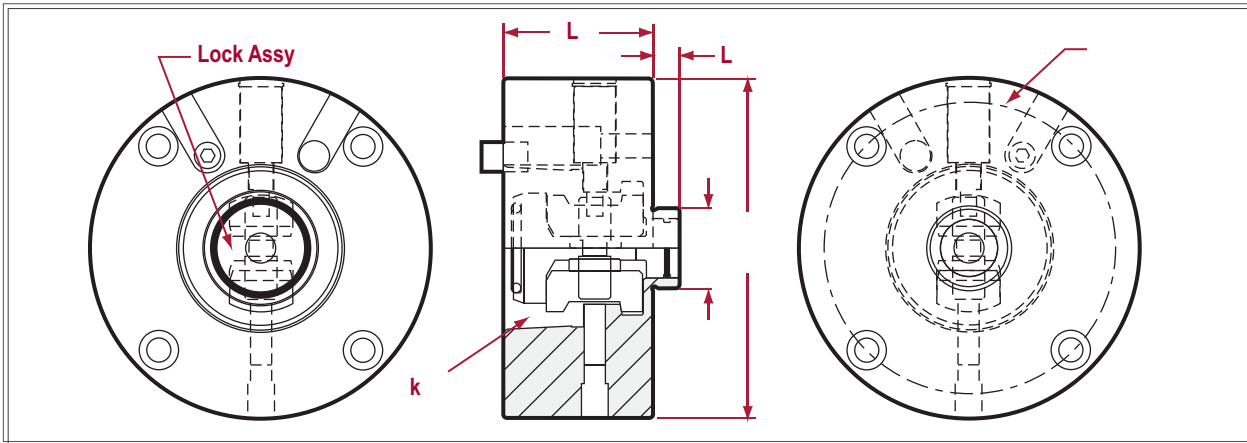
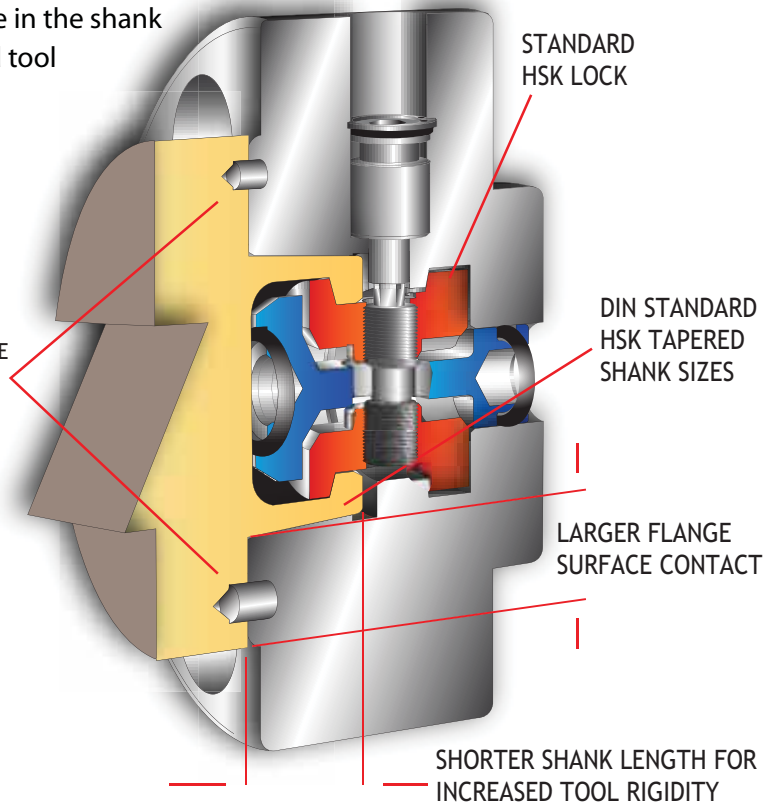
1 LOCATOR PIN AND 1 ERROR PROOF PIN ON THE FLANGE FOR TOOL LOCATION AND POSITIONING  
11 Possible Error Proof Positions (1 Every 30°)



2 DIFFERENT SIZE ERROR PROOF PINS ON THE FLANGE FOR TOOL LOCATION AND POSITIONING



(HSK Drive Keys create the possibility of NOT mounting the tool flange flush with the adapter flange)

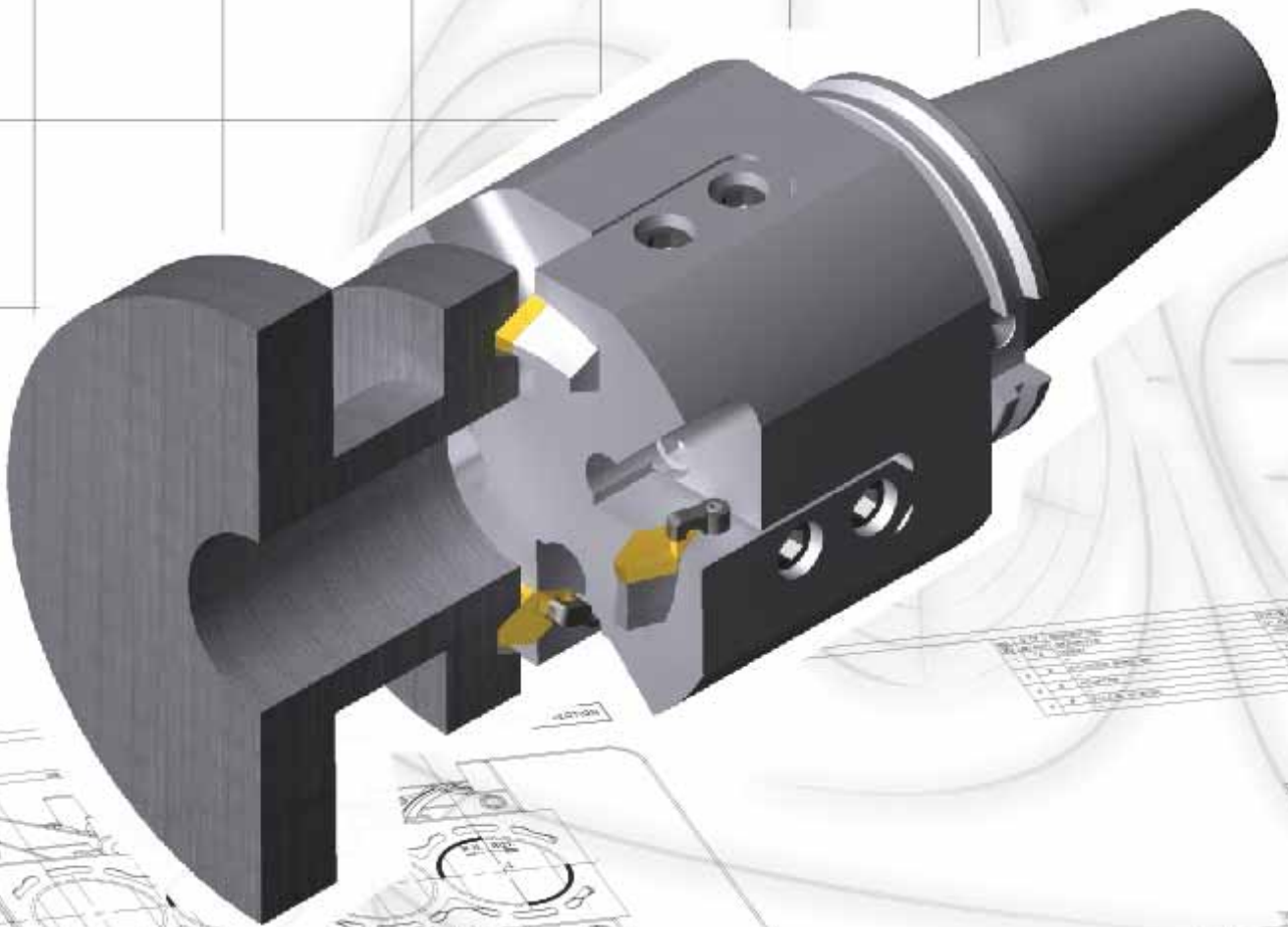


| Part Number | k     | D1 (MIN)        | D2               | L1               | L2                | Lock Assy       |       |
|-------------|-------|-----------------|------------------|------------------|-------------------|-----------------|-------|
| ANH40 -*    | NWH40 | 1.97<br>(50)    | 2.48<br>(62.9)   | .7087<br>(18.00) | 1.2598<br>(32)    | 2.362<br>(6.0)  | HKL30 |
| ANH50 -*    | NWH50 | 2.150<br>(54.6) | 3.97<br>(100.83) | 1.00<br>(25.4)   | 1.438<br>(36.51)  | .325<br>(8.24)  | HKL38 |
| ANH63 -*    | NWH63 | 3.15<br>(80.00) | 3.97<br>(100.83) | .945<br>(24.00)  | 1.732<br>(44.00)  | .315<br>(8.0)   | HKL48 |
| ANH80 -*    | NWH80 | 4.25<br>(107.9) | 5.00<br>(127.0)  | 1.18<br>(30.0)   | 2.2047<br>(56.00) | .3937<br>(10.0) | HKL60 |

These are standard adapters to match your requirements

# RING GROOVE

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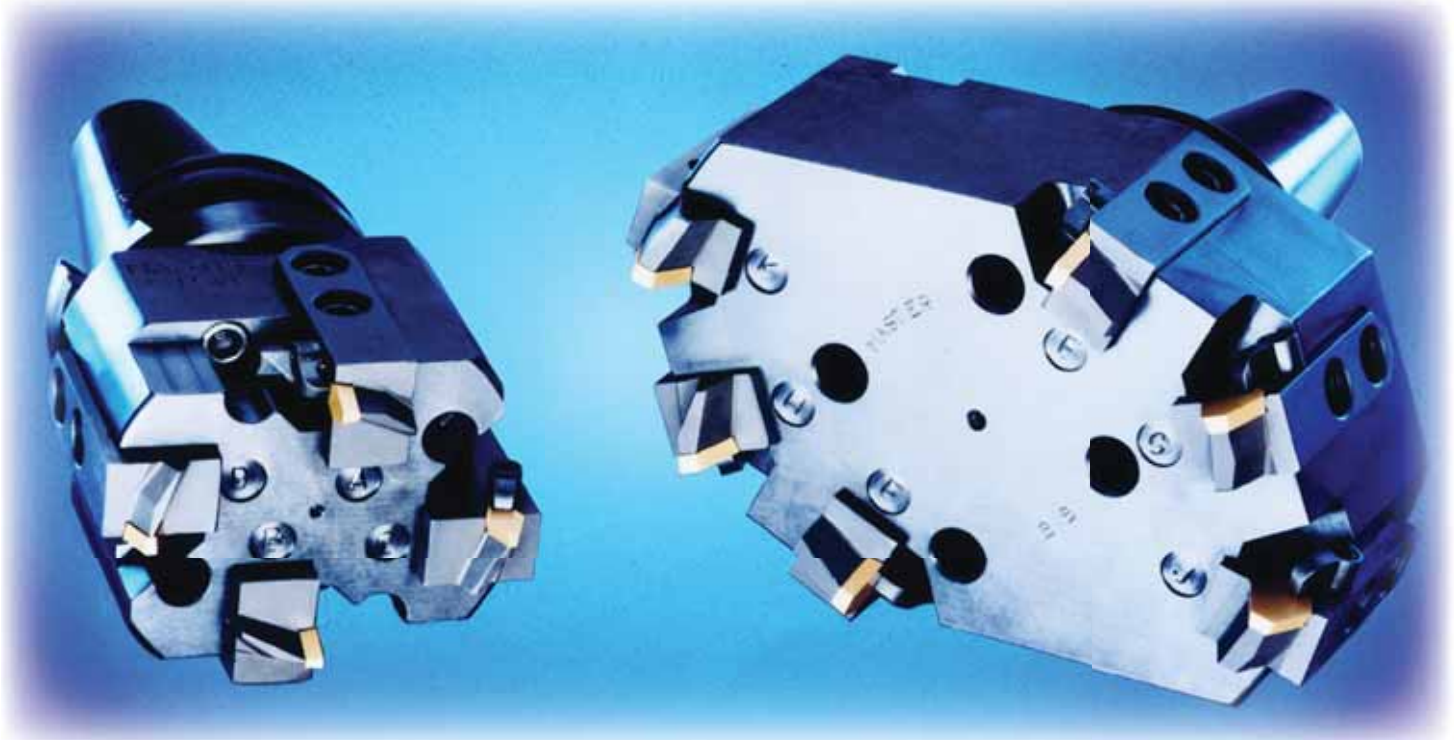


# MASTER TOOL DIVISION'S QUALIFIED RING GROOVE TOOLING SYSTEM

*...The only system **GUARANTEED** to cut  
API ring grooves to size with no adjustments*

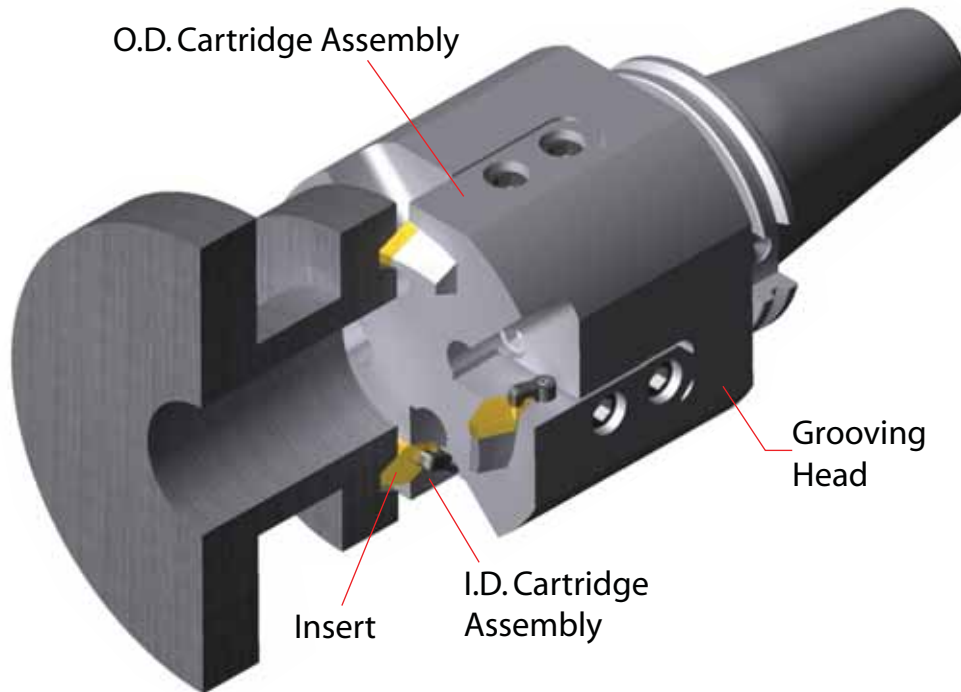
**2 HEADS AND 45 CARTRIDGES WILL MACHINE  
ALL BX,R & RX SIZES FROM 2-1/4" TO 8-1/2" TO  
!!! EXACT API STANDARDS!!!**

*Groove depth is the only dimension you need to set*  
**ALL OTHER CHARACTERISTICS ARE QUALIFIED AND HELD  
BY MASTER TOOL DIVISION**





## COMPONENTS:



*Unique design approach requires insert to cut one side only -*  
**SIGNIFICANTLY REDUCING CUTTING PRESSURES AND**  
**ELIMINATING TOOL DEFLECTION PROBLEMS**

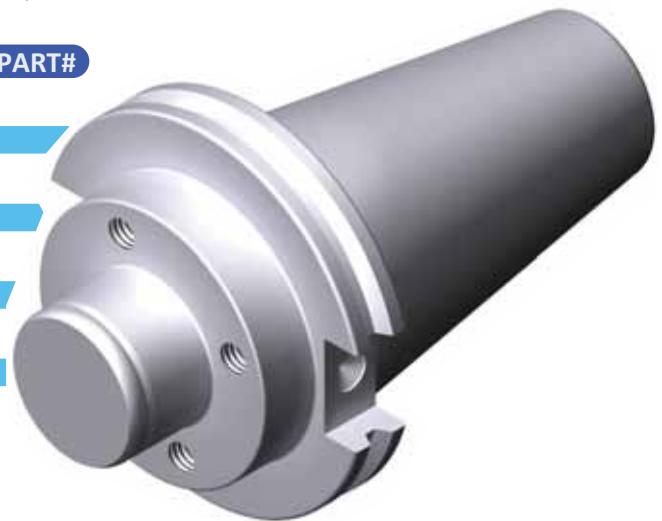


## SHANKS:

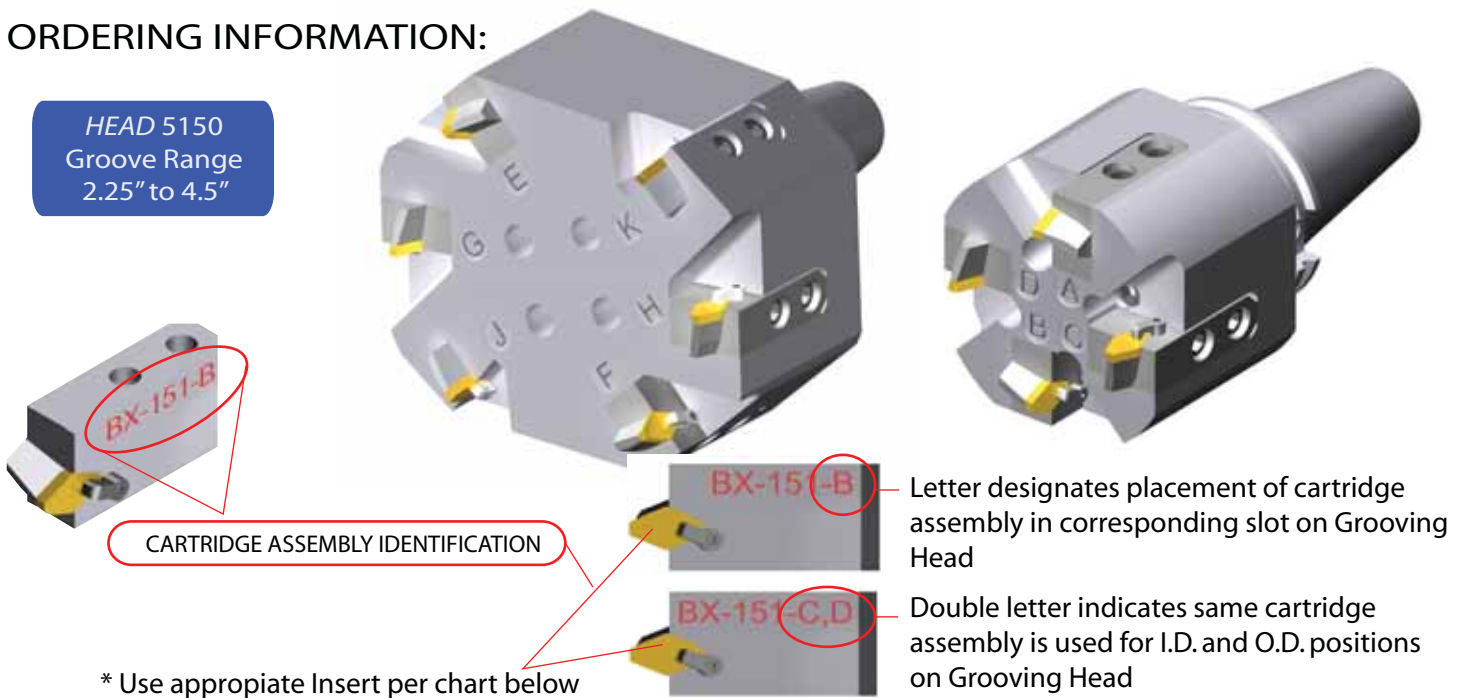
*Master Tool Division offers a wide range of shanks to meet your needs*

| INDUSTRY STANDARD SHANK    | MASTER TOOL DIVISION PART# |
|----------------------------|----------------------------|
| # 50 V-FLANGE              | CV50 - BR 1.5              |
| # 45 V-FLANGE              | CV45 - BR 1.5              |
| # 50 CINCINNATTI           | CN50 - BR 1.5              |
| # 45 CINCINNATTI           | CN45 - BR 1.5              |
| # 50 NMTB                  | NMTB50 - BR 1.5            |
| #5 MORSE TAPER             | MT5 - BR 1.5               |
| #6 MORSE TAPER             | MT6 - BR 1.5               |
| 2.500" DIA. STRAIGHT SHANK | 40 - 5 - BR 1.5            |
| 2.000" DIA. STRAIGHT SHANK | 32 - 5 - BR 1.5            |

*\* Shanks not listed above can be supplied per customer requirements*



## ORDERING INFORMATION:



\* Use appropriate Insert per chart below

| RING SIZE | *INSERT       | HEAD #        | I.D. CARTRIDGE | O.D. CARTRIDGE | CLAMP #      | CLAMP SCREW |         |         |
|-----------|---------------|---------------|----------------|----------------|--------------|-------------|---------|---------|
| RX - 18   | 5152-1        | 5150          | RX - 18 - A    | RX - 18 - B    | CK - 22      | STC - 11    |         |         |
| RX - 20   |               |               | RX - 20 - A    | RX - 20 - B    |              |             |         |         |
| RX - 23   | RX - 23 - C,D |               | RX - 23 - C,D  |                |              |             |         |         |
| RX - 24   | RX - 24 - C,D |               | RX - 24 - C,D  |                |              |             |         |         |
| RX - 26   | RX - 26 - C,D |               | RX - 26 - C,D  |                |              |             |         |         |
| RX - 27   | RX - 27 - C,D |               | RX - 27 - C,D  |                |              |             |         |         |
| RX - 31   | 5152-2        | 5151          | RX - 31 - E,F  | RX - 31 - E,F  | CK - 13      | STC - 8     |         |         |
| RX - 35   |               |               | RX - 35 - E,F  | RX - 35 - E,F  |              |             |         |         |
| RX - 37   |               |               | RX - 37 - G,H  | RX - 37 - G,H  |              |             |         |         |
| RX - 39   |               |               | RX - 39 - G,H  | RX - 39 - G,H  |              |             |         |         |
| RX - 41   |               |               | RX - 41 - G,H  | RX - 41 - G,H  |              |             |         |         |
| RX - 44   |               |               | RX - 44 - J,K  | RX - 44 - J,K  |              |             |         |         |
| RX - 45   | RX - 45 - J,K | RX - 45 - J,K |                |                |              |             |         |         |
| RX - 46   | 5152-4        |               | RX - 46 - K    | RX - 46 - K    |              |             |         |         |
| RX - 82   | 5152-2        | 5150          | RX - 82 - A,B  | RX - 82 - A,B  |              |             | CK - 13 | STC - 8 |
| RX - 84   |               |               | RX - 84 - A,B  | RX - 84 - A,B  |              |             |         |         |
| RX - 85   | 5152-4        |               | RX - 85 - A    | RX - 85 - B    |              |             |         |         |
| RX - 86   | 5152-5        |               | RX - 86 - C    | RX - 86 - D    |              |             |         |         |
| RX - 87   |               |               | RX - 87 - C    | RX - 87 - D    |              |             |         |         |
| RX - 88   |               |               | 5151           | RX - 88 - E    |              |             |         |         |
| RX - 89   | RX - 89 - E   | RX - 89 - F   |                |                |              |             |         |         |
| RX - 90   | RX - 90 - G   | RX - 90 - H   |                |                |              |             |         |         |
| BX - 150  | 5152-2        | 5150          | BX - 150 - A   | BX - 150 - B   |              |             |         |         |
| BX - 151  |               |               | BX - 151 - A   | BX - 151 - B   |              |             |         |         |
| BX - 152  | BX - 152 - A  |               | BX - 152 - B   |                |              |             |         |         |
| BX - 153  | 5152-3        |               | BX - 153 - C   | BX - 153 - D   |              |             |         |         |
| BX - 154  |               |               | BX - 154 - C   | BX - 154 - D   |              |             |         |         |
| BX - 155  |               |               | 5151           | BX - 155 - E   | BX - 155 - F |             |         |         |
| BX - 169  | BX - 169 - G  | BX - 169 - H  |                |                |              |             |         |         |



**CLEVELAND, OHIO**

2.5 LITER BLOCK  
3.0 LITER BLOCK

**DAIMLER CHRYSLER™**

**KENOSHA, WI**

2.7 LITER BLOCK

**TRENTON, MI**

3.2 LITER BLOCK  
3.5 LITER BLOCK

**CURTIBA, BRAZIL**

1.6 LITER BLOCK



**ROMULUS, MI**

GEN3 - 96MM BLOCK  
GEN3-98MM BLOCK  
GEN3-100MM BLOCK

**LIVONIA, MI**

3.5 LITER BLOCK  
PV-6 BLOCK  
CADILLAC NORTHSTAR



**SILAO, MEXICO**

GEN3 - 96MM BLOCK  
GEN3 - 98MM BLOCK  
GEN3 - 100MM BLOCK



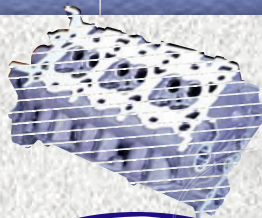
**COLUMBUS, IN**

SIGNATURE 600 BLOCK  
AHD BLOCK



**ST. CATHERINE'S (CAN)**

GEN3 - 96MM BLOCK  
GEN3 - 98MM BLOCK  
GEN3 - 100MM BLOCK



**CLEVELAND, OHIO**

2.5 LITER BLOCK  
3.0 LITER BLOCK  
JAGUAR HEAD

**DAIMLER CHRYSLER™**

**KENOSHA, WI**

3.7 LITER HEAD



**COLUMBUS, IN**

SIGNATURE 600 HEAD  
AHD HEAD



**ST. CATHERINE'S (CAN)**

GEN1E - HEAD



**ROCKY MOUNT, NC**

ENCORE HEAD

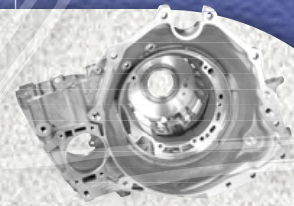


**INTERNATIONAL**

**NAVISTAR™**

**INDIANAPOLIS, IN**

NGD DIESEL HEAD



**SHARONVILLE, OHIO**

E40D TRANSMISSION CASE

**SHARONVILLE, OHIO**

FN TRANSAXLE CASE

**DAIMLER CHRYSLER™**

**KOKOMO, IN**

45RFE TRANSMISSION CASE  
A604 TRANSMISSION CASE

**TOLUCA, MEXICO**

4RFE TRANSMISSION CASE



**ROMULUS, MI**

4L60-E TRANSMISSION CASE

**INDIANAPOLIS, IN**

ALLISON TRANSMISSION



**SALTILLO, MEXICO**

4L60-E TRANSMISSION CASE



**CLEVELAND, OHIO**

2.5 LITER BLOCK  
3.0 LITER BLOCK

**DAIMLER CHRYSLER™**

**KENOSHA, WI**

2.7 LITER BLOCK

FOR MORE INFORMATION CALL, EMAIL OR WRITE TO:

**SUMITOMO ELECTRIC CARBIDE MANUFACTURING, INC.**

**MASTER TOOL DIVISION**

210 RIVER STREET, GRAND RIVER, OHIO 44045

PHONE: (440)354-0600 FAX: (440)354-6372

WEBSITE: [mtctools.com](http://mtctools.com) EMAIL: [master@mtctools.com](mailto:master@mtctools.com)



# SUMITOMO

**CARBIDE - CBN - DIAMOND**

## **Sumitomo Electric Carbide, Inc.**

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Mount Prospect, IL 60056-2181  
P.O. Box 545, Mt. Prospect, IL 60056-0545  
Phone: (800) 950-5202  
Phone: (847) 635-0044  
Fax: (847) 635-7866  
<http://www.sumicarbide.com>

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Phone: (800) 239-5177  
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Fax: (734) 451-5338

### **Cincinnati Branch**

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Cincinnati, OH 45242-5545  
Phone: (800) 879-1887  
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