ISCAR’s Solutions for Manufacturing Turbochargers
In today’s modern world, engine downsizing continues to dominate the automotive industry. Nowadays, turbochargers not only appear in large diesel engines but also in gasoline engines. A turbocharger can significantly boost the engine’s horsepower without significantly increasing its weight, and provides high-performance and added benefits for modern cars. The turbocharger provides many advantages for drivers, yet places a challenge for OEMs. Surviving extreme operating conditions, very high temperatures and spinning at high speed revolutions per minute (rpm) are just some of the circumstances that drive OEMs to look for new materials and investigate new technologies during real time. ISCAR’s global industry experiences place the customer at the forefront, aiming to provide higher Productivity, Profitability and Performance gains. In the automotive industry and field of turbochargers, ISCAR presents innovative solutions and full stable processes for turbocharger related components. ISCAR views OEMs as high-priority customers and undertakes to build long-term cooperation. ISCAR partnership goals recommend efficient and economical solutions and consequently provide high-quality products and long lasting support.
Bearing Housing
Material: Cast Iron

1. **CUTGRIP GIF 8.00E... IC5010**
   - Double-ended insert
   - Excellent chipbreaker
   - High toughness

   Cutting conditions:
   \[
   \begin{align*}
   V_c &= 250 \text{ m/min (820 sfm)} \\
   f &= 0.25 \text{ mm/rev (0.0098 inch/rev)}
   \end{align*}
   \]

2. **HELI FACE HFPR 4... IC5010**
   - Double-ended insert
   - Twisted geometry
   - Increased tool life
   - Increased cutting speed

   Cutting conditions:
   \[
   \begin{align*}
   V_c &= 200 \text{ m/min (656 sfm)} \\
   f &= 0.15 \text{ mm/rev (0.0059 inch/rev)}
   \end{align*}
   \]

3. **PENTACUT PENTA 24... IC907**
   - 5 cutting edges (economical)
   - Precise profile
   - Durable insert design

   Cutting conditions:
   \[
   \begin{align*}
   V_c &= 150 \text{ m/min (495 sfm)} \\
   f &= 0.1 \text{ mm/rev (0.0039 inch/rev)}
   \end{align*}
   \]

- **Combined Groove Turn**
  - Axially adjustable for precise grooving
  - Strong gripping forces
  - Quick insert replacement

- **Integral Groove Turn**
  - Extremely rigid clamping
  - Quick insert change
  - Face grooving, turning and boring

- **Internal Grooving**
  - Easy and fast edge indexing
  - Rigid clamping system provides improved performance
  - Excellent surface finish
  - High grooving repeatability
**ISO TURN**

**WNGP 04... IC908**
- Double-sided inserts
- Positive rake
- Low cutting forces

**Cutting conditions**
- \( V_c = 130 \text{ m/min} \ (426 \text{ sfm}) \)
- \( f = 0.1 \text{ mm/rev} \ (0.0039 \text{ inch/rev}) \)

**Internal Turning**
- Enables boring small diameters
- Rigid screw clamping
- Excellent finish surface
- Coolant nozzle directed to the cutting edge

**INDEXH-REAM**

**RM-SEI... IC907**
- 2 cutting edges
- High cutting speed
- Versatile lead and rake geometries selection
- Precisely ground insert

**Cutting conditions**
- \( V_c = 80 \text{ m/min} \ (263 \text{ sfm}) \)
- \( f = 0.25 \text{ mm/rev} \ (0.0098 \text{ inch/rev}) \)

**Indexable Reaming**
- Adjustable system
- Extreme accuracy (for IT5 tolerance and up)
- Suitable for reaming interrupted holes
- High surface finish

**MINICUT**

**MIGR 8... IC908**
- Unique convenient screw clamping
- Efficient in grooving at small diameters
- Wide range of insert profiles

**Cutting conditions**
- \( V_c = 110 \text{ m/min} \ (360 \text{ sfm}) \)
- \( f = 0.02 \text{ mm/rev} \ (0.0007 \text{ inch/rev}) \)

**Internal Profiling**
- Provides versatility advantages
- Coolant nozzle directed right to the cutting edge
Turbine Wheel/Shaft

Shaft Material: Steel
Wheel Material: Inconell, TiAl Alloy

ISO TURN

1. DNMG… IC8250
   • Double-sided insert
   • Positive rake for low cutting forces
   • High toughness

   Cutting conditions
   Vc=180 m/min (590 sfm)
   f=0.25 mm/rev (0.0098 inch/rev)

ISO TURN

2. VCMT… IC8250
   • Moderated chipbreaker
   • Precisely ground insert
   • Excellent repeatability

   Cutting conditions
   Vc=180 m/min (590 sfm)
   f=0.1 mm/rev (0.0039 inch/rev)

PENTACUT-24

3. PENTAcut… IC908
   • 5 cutting edges (economical)
   • Precise profile
   • Durable insert design
   • Pressed chipbreaker for effective chip control

   Cutting conditions
   Vc=160 m/min (525 sfm)
   f=0.08 mm/rev (0.0031 inch/rev)

High Pressure Rough Turn
• High pressure coolant directed right to the cutting edge
• Shiftable telescopic coolant tube for easy and fast insert replacement
• Quick change lever lock mechanism

High Pressure Finish Turn
• High pressure coolant directed right to the cutting edge
• Shiftable telescopic coolant tube for easy and fast insert replacement
• Quick change lever lock mechanism

Slot - Groove-Turn
• Excellent surface finish
• High grooving repeatability
• High pressure coolant for chip evacuation and longer tool life

Shaft Material: Steel
Wheel Material: Inconell, TiAl Alloy
Penta Wheel/Shaft

High Pressure Threading

- Extreme accuracy
- Excellent surface finish
- High pressure coolant for effective chip control and longer tool life

Penta 24... IC908

- 5 cutting corners
- High cutting speed
- Unique pressed chipformer
- Wide range of threading types

Cutting conditions

Vc=15 m/min (50 sfm)
f=Pitch

ISCAR Mill

RXCR 07... IC808

- Low cutting forces
- High stability cutting
- Moderated chipbreaker

Cutting conditions

Vc=35 m/min (115 sfm)
fz=0.1 mm/t (0.0039 inch/t)

Milling (Dynamic balance)

- Indexable profiling tool
- High material removal rate

Shaft Material: Steel
Wheel Material: Inconell, TiAl Alloy
Turbine Housing

Material: Austenitic Heat-Resistant Cast Steel

Face Milling (Roughing)
- **ONMU... IC5400**
  - For ap ≤ 3.5 mm
  - Economical: 16 cutting edges
  - Precisely ground or utility insert

**Option 1. Standard solution**
- Well-secured inserts
- Durable cutter body
- Versatile face mill (suitable for both inserts)

**Cutting conditions**
- \( V_c = 150 \text{ m/min (495 sfm)} \)
- \( f_z = 0.2 \text{ mm/t (0.0078 inch/t)} \)

Face Milling (Finishing)
- High-positive pocket inclination
- Extremely rigid clamping due to dovetail pocket
- Axial adjustment for fine surface finish
- Fine pitch for increased metal removal rate

**Option 2. Special solution**
- Axially adjustable runout for precise overhang / uniform wear

**Cutting conditions**
- \( V_c = 115 \text{ m/min (378 sfm)} \)
- \( f_z = 0.18 \text{ mm/t (0.0070 inch/t)} \)

Slot Milling
- Tangential clamping for maximum stability
- Safe clamping (no insert pulling out during machining)
- Self clamping mechanism (without screw)
- Designed for high speed machining

**Option 1. Standard solution**
- Well-secured inserts
- Durable cutter body
- Versatile face mill (suitable for both inserts)

**Cutting conditions**
- \( V_c = 150 \text{ m/min (495 sfm)} \)
- \( f_z = 0.25 \text{ mm/t (0.0098 inch/t)} \)

**Option 2. Special solution**
- Axially adjustable runout for precise overhang / uniform wear

**Cutting conditions**
- \( V_c = 70 \text{ m/min (230 sfm)} \)
- \( f_z = 0.07 \text{ mm/t (0.0027 inch/t)} \)

* For SiMo, Ductile Cast iron and other materials, insert grades to be selected accordingly
* All the tools are available for dry machining, MQL and coolant
Turbine Housing

Interpolation Turning (Finishing)
- Rigid clamping method
- Adjustable design for high precision

Cutting conditions
- Vc=90 m/min (295 sfm)
- f=0.2 mm/rev (0.0078 inch/rev)

Spot Facing & Chamfering
- High effective solution
- One path solution

HTP LN... IC808
- 4 cutting edges
- Positive rake - low cutting forces
- Tangential durable design

SVMT-SM... IC8150
- Smooth cut
- High wear resistance

Cutting conditions
- Vc=100 m/min (330 sfm)
- fz=0.16 mm/t (0.0062 inch/t)

Plunging (Roughing)
- One path solution (combined tool)
- Excellent surface finish
- Efficient utilization of the insert edges

HTP LN... IC808
- 4 cutting edges
- Positive rake - low cutting forces

Interpolation Turning (Finishing)
- Rigid clamping method
- Adjustable design for high precision

GIP... IC806
- Precise profiling
- Double - ended insert
- Excellent surface finish

Cutting conditions
- Vc=90 m/min (295 sfm)
- f=0.2 mm/rev (0.0078 inch/rev)

Material: Austenitic Heat-Resistant Cast Steel

GIP... IC806
- Precise profiling
- Double - ended insert
- Excellent surface finish

Cutting conditions
- Vc=90 m/min (295 sfm)
- f=0.2 mm/rev (0.0078 inch/rev)
**Turbine Housing**

Material: Austenitic Heat-Resistant Cast Steel

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**1. ICP... IC908**

- Exchangeable drill heads
- NO setup time
- High repeatability
- High productivity

**Cutting conditions**

\[
\begin{align*}
V_c &= 100 \ \text{m/min} \ (330 \ \text{sfm}) \\
f &= 0.1 \ \text{mm/rev} \ (0.0039 \ \text{inch/rev})
\end{align*}
\]

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**2. PRETHREAD**

**AOMT 06...-45DT IC908**

- Optimal chipformation
- 2 cutting edges
- Suitable for chamfer and boring operations

**Cutting conditions**

\[
\begin{align*}
V_c &= 40 \ \text{m/min} \ (130 \ \text{sfm}) \\
f &= 0.6 \ \text{mm/rev} \ (0.0023 \ \text{inch/rev})
\end{align*}
\]

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**3. BAYOT-REAM**

**RM-BN...LBS IC908**

- Interchangeable solid carbide heads
- Quick change bayonet mechanism
- ZERO setup time
- For IT6 tolerance and up
- Coolant access to each cutting edge

**Cutting conditions**

\[
\begin{align*}
V_c &= 60 \ \text{m/min} \ (197 \ \text{sfm}) \\
f &= 0.08 \ \text{mm/rev} \ (0.0032 \ \text{inch/rev})
\end{align*}
\]

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**Drill & Chamfering**

- Indexable head drills with chamfering inserts
- Drilling and chamfering in one tool
- No setup time
- High productivity

**Reaming**

- Unique quick-change bayonet mechanism
- High cutting speeds and feeds
- Low runout (maximum 3µm)
- No setup time

**Drill & Chamfering**

- Two tools in one operation
- Excellent performance

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* For SiMo, Ductile Cast iron and other materials, insert grades to be selected accordingly
* All the tools are available for dry machining, MQL and coolant
Circular Interpolation Finishing
• Shortest possible cycle time
• Suitable for machining in places with limited approach
• Rigid tangential clamping method

Cutting conditions
Vc=80 m/min (263 sfm)
fz=0.11 mm/t (0.0043 inch/t)

Tangential Clamping Method
• 4 cutting edges
• Positive rake - low cutting forces
• Tangential durable design

LNET... IC908
• 2 cutting edges
• Precisely ground insert

Cutting conditions
Vc=65 m/min (215 sfm)
fz=0.2 mm/t (0.0078 inch/t)

Plunging Roughing
• Reduces cut-to-cut time
• Several operations with one tool
• Adjustment mechanism for precise face

TANGPLUNGE
PLUNGING LINE
HTP LN... IC808
• 4 cutting edges

MINI-TANGSLOT
LNET... IC928
• 4 cutting edges
• Reduced cutting forces
• Precision grooving
• Reduced chatter

Grooving (safety cut)
• Tangentially clamped inserts
• High efficiency and economy
• Coolant through

Cutting conditions
Vc=65 m/min (215 sfm)
fz=0.2 mm/t (0.0078 inch/t)
Compressor Housing

Material: Aluminum Alloy

1. **External Form Milling**
   - Prolonged tool life
   - Excellent surface finish
   - High speed machining of aluminum alloys
   - Coolant through for improved chip control

2. **Internal Form Boring**
   - High effective solution
   - Excellent surface finish
   - High profile repeatability
   - Coolant through for improved chip control

3. **Integral Boring**
   - Quick insert change
   - No need for regrindings
   - Extremely rigid clamping
   - Coolant through

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**ISCAR PCD LINE**

1. High accuracy
   - Brazed PCD tips
   - Precisely ground profile
   - High machining parameters

   **Cutting conditions**
   - $V_c = 600 \text{ m/min (1970 sfm)}$
   - $f_z = 0.08 \text{ mm/t (0.0032 inch/t)}$

2. Brazed PCD tips
   - Precisely ground profile
   - Improved wear resistance

   **Cutting conditions**
   - $V_c = 400 \text{ m/min (1300 sfm)}$
   - $f_z = 0.12 \text{ mm/t (0.0047 inch/t)}$

3. **XNUW…/ TCMT… ID5**
   - Brazed PCD tips inserts
   - Increased cutting parameters

   **Cutting conditions**
   - $V_c = 700 \text{ m/min (1970 sfm)}$
   - $f_z = 0.2 \text{ mm/t (0.0078 inch/t)}$
**ALUFRAISE**

- PCD tipped cartridge
- High accuracy Ra0.4µm
- Wide range of insert types
- High machining parameters

Cutting conditions:
Vc=2500 m/min (8200 sfm)
fz=0.07 mm/t (0.0028 inch/t)

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**ISCAR PCD LINE**

- Brazed PCD tips
- Smooth top surface
- Precisely ground profile

Cutting conditions:
Vc=1200 m/min (3900 sfm)
fz=0.08 mm/t (0.0032 inch/t)

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**ISCAR PCD LINE**

- Excellent tool life
- High cutting speed

Cutting conditions:
Vc=600 m/min (1970 sfm)
fz=0.1 mm/t (0.0039 inch/t)

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**Face Miling**

- Lightweight body
- Unique coolant system through a cover
- Axially adjustable cartridges for runout elimination
- User-friendly adjustment system
- High speed machining

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**Slot Milling**

- Excellent surface finish
- Excellent part straightness
- Coolant supply to each cutting edge

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**External Forming**

- Extreme accuracy
- High surface finish
- Coolant through

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Material: Aluminum Alloy
ISCAR's High Productivity Solutions for the Automotive Industry

Machining Intelligently

Indexable drilling heads for high productivity and extended tool life

SUMO CHAM IQ LINE
Indexable drilling heads for high productivity and extended tool life

DOVE IQ MILL
Dovetail clamped milling insert with 8 edges, for less power consumption and smooth finish

PENTAL IQ GRIP
Unique 5 cornered insert for larger parting diameter and deeper grooving capacities
Interchangeable solid carbide reaming head system for accuracy and high productivity

Wide range of ISOTURN small sized inserts for increased profitability

No Time for Downtime!

BAYOT-REAM
Interchangeable solid carbide reaming head system for accuracy and high productivity

FLASHTURN
Wide range of ISOTURN small sized inserts for increased profitability

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