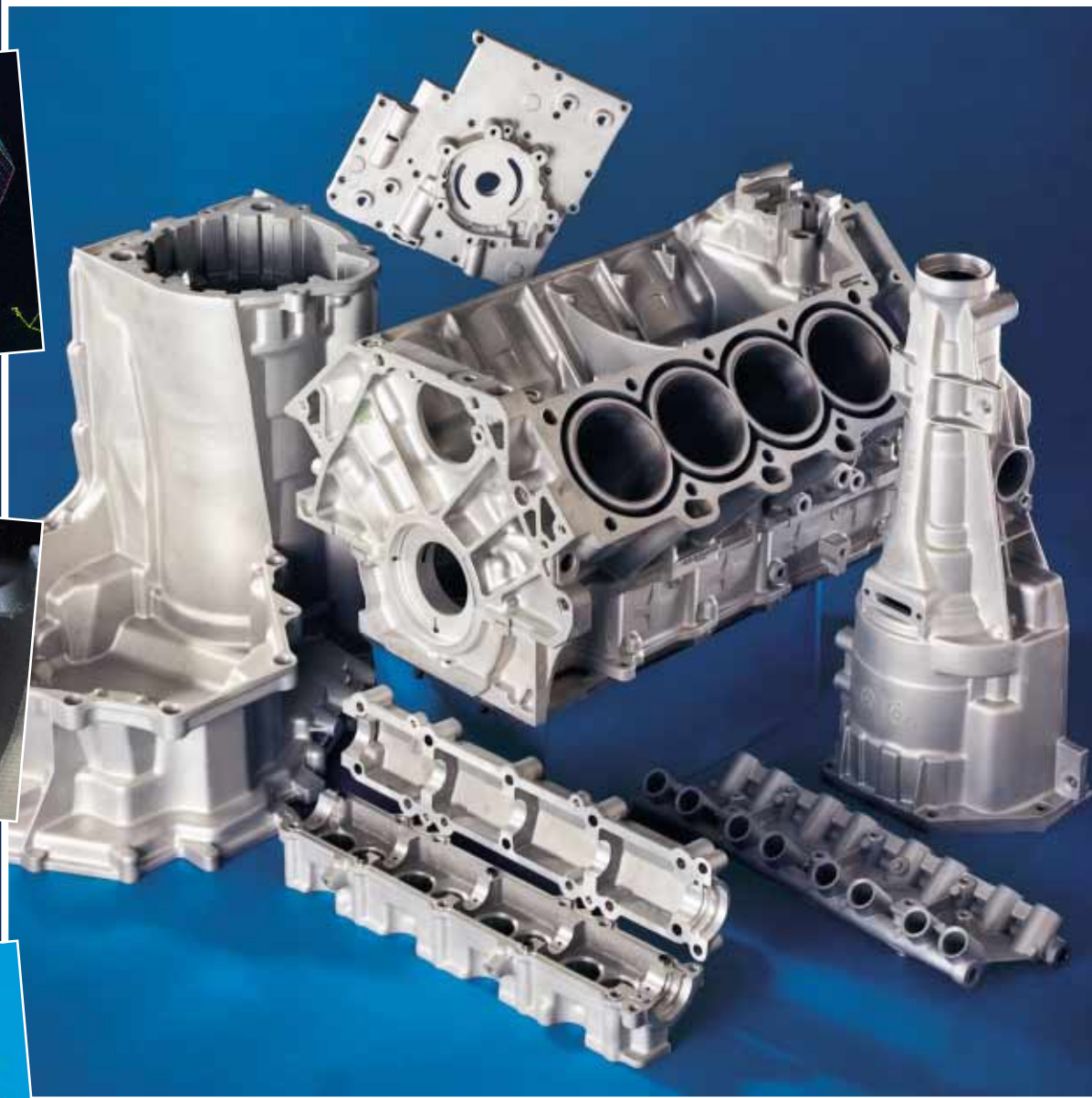
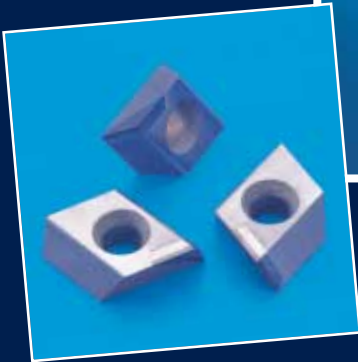
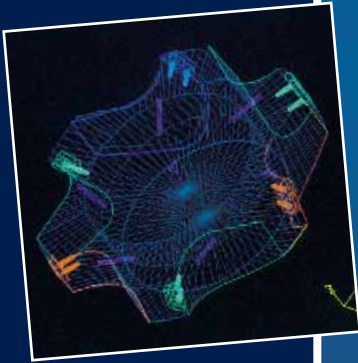


# *Automotive Aluminum Solutions*



**Ingersoll**  
Cutting Tools

# Ingersoll and Automotive

Ingersoll has a long standing relationship with the automotive industry. The first engine machined with Ingersoll cutting tools was the Ford Model T. Since that time, Ingersoll has remained wholly committed to advancing the state of metalworking technology.

From the high production machines of the 1930's, to the large, high-performance engines of the 1960's, to the thin-walled engines of the 1980's, to the aluminum blocks of the 1990's, Ingersoll Cutting Tool Company has always provided innovative and cost-effective metal cutting solutions for the automotive industry.

## Special Tooling

Some applications may lie outside the range or capabilities of our standard product line. The ability to define problems, evaluate options and design effective metal removal solutions has been an Ingersoll hallmark for over 100 years.

Our extensive resources of skilled engineers, computer equipment, manufacturing facilities, and our close association with machine tool builders around the world uniquely qualify us to design and produce special metal removal cutters for virtually any operation and material:

## Automotive Applications

Our expertise includes roughing, semi-finishing, and finishing of all engine components, including:

- Cylinder Heads
- Engine Blocks
- Transmission Housings
- Brake Components
- Suspension Components
- Steering Components
- Crankshafts
- Camshafts
- Connecting Rods
- Pistons
- Intake, Exhaust Manifolds
- Oil, Fuel and Water Pumps
- Cam Carriers
- Fuel Rails

## Automotive Aluminum Applications

The automotive industry demands quality, low cost-per-part and reduction of cycle time to optimize throughput. Our experience and products can benefit you in many areas:

- Part Quality  
*Long tool life, extremely fine surface finish, superior flatness, consistent repeatability and more...*
- Machine Types  
*Transfer line, dial machines, high speed machining centers, high production machining cells and more...*
- Applications  
*Milling of all major faces on engine blocks and components, interrupted cuts, bi-metal applications, high-silicon content materials and more...*



# Standard Solutions

Automotive metal removal is an exacting science. Few standard products will do the job adequately. After years of development for automotive applications and aluminum removal, we offer three that are particularly well suited to automotive aluminum metal removal:

## Series 6X4B Face Mills

Roughing, finishing, one-cuts and cutting 90° shoulders

- Slight negative lead angle for shoulder relief.
- Free-cutting double positive geometry, balanced for speeds to 3,000 SFM.
- Pocket protection on -R01 versions.
- Inserts are flat-on-face.
- Barrel screw adjustment available.
- PCD inserts available.

## Series 6X4S Face Mills

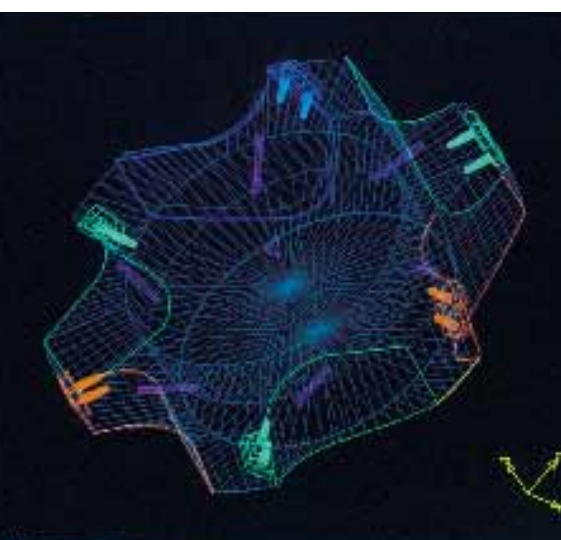
Roughing, finishing and one-cuts

- 20° lead.
- Free-cutting double positive High-Shear geometry.
- Balanced for speeds to 3,000 SFM.
- Barrel screw adjustment available.
- Pocket protection available.
- PCD inserts available.

## Series 6XPS Face Mills

Fine finishing on engine block and cylinder head joint faces and automotive component mounting faces

- Bi-metal tool construction in diameters of 8.00" and above for light-weight strength.
- Double positive peripheral inserts with face mounted Micro-Mill wiper for superior finishes.
- Balanced for speeds to 5,000 SFM.
- Barrel screws for precision axial runout adjustment.
- Through-the-tool coolant.
- PCD inserts available.



# Specialized Solutions

## **Modified Standard Tooling**

When Ingersoll standard tooling is close, but not precisely the right size or shape, our Modified Standards program will give you exactly what you need. With it, we can design and build custom cutters at a fraction of the price and lead time you might expect because much of the engineering has already been done.

## **Special Tooling**

Automotive metal removal is primarily a specials market. Ingersoll has been making specials for over 100 years. Ingersoll tools helped produce the first Model T. That kind of experience is hard to come by. Ingersoll Cutting Tools has the experience and the people to design and build special indexable or grind-style tooling to suit virtually any automotive application.



# Product Features



## Barrel Screws

When surface finish and tolerance require extreme care and accuracy, barrel screws can reduce face runout to tenths.

- Hardened to resist deformation.
- Black oxidized to prevent corrosion.
- Nylon pellet in the thread prevents shifts during operation.
- Right-hand inserts use left-hand barrel screws and vice-versa to keep inserts firmly in pockets.
- Mating surface is reamed to provide 120° contact to assure accuracy and minimize wear.
- The barrel screw maintains consistent contact with the mating surface throughout its entire adjustment range.

## Dynamic Balancing

At higher milling speeds, vibration can become a significant problem. Often, the best solution is to dynamically balance the tool after manufacture.

- Minor fabrication unbalance may become intolerable at high speeds.
- Ingersoll has dedicated CNC dynamic balancing equipment.
- Computer calculated material removal efficiently balances tools.
- High speed evaluations are performed for applications over 3,000 SFM to determine the feasibility and comparative worth of tool balancing.
- No tool is released unless capable of speeds well above these intended.
- Due to their inherently strong structure, Ingersoll cutters lend themselves well to high speed machining without the risk of cutter disintegration or insert separation.



## PCD Inserts

Polycrystalline Diamond (PCD) inserts are designed for machining aluminum alloys, bronze, brass, copper, zinc, and non-metals like graphite, carbon composites and plastics.

- Ingersoll's PCD grade is ICT411.
- Positive geometry is required for PCD use to minimize cutting pressure as well as built-up edges.
- Due to the high speeds typically used with PCD inserts, barrel screws are recommended to minimize face runout.
- PCD should only be considered for long run jobs where extremely long tool life and high production can justify the additional costs.



**Rockford, Illinois / Burbach, Germany**  
ISO 9001 registered

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**INGERSOLL**