ISCAR's Solutions for the Railway Industry

Machining Intelligently
ISCAR HIGHQ LINES

Member IMC Group
www.iscar.com
Railway Industry

The railway industry has played an important role in the past two decades becoming one of the leading means of transportation for freight and passengers. Ongoing investments in modern railway track infrastructure has opened a new edge to high-speed transportation mobility. In addition, the environmental advantages offered in railway transportation is expanding railway traffic awareness. To keep up with the growing demands in this heavy metalworking industry, ISCAR has developed special machining expertise for railway components with innovative cutting tools and robust carbide grades.

Environmental Value

- Reduced Highway Congestion
- Fuel Efficiency
- Fewer Emissions

Transportation

- Diesel Locomotive (~200 Km/Hr.)
- High Speed Train (~380 Km/Hr.)
- Electric Train
- Heavy Cargo Freight Train
- Underground Train
- Inner City Light Rail
Typical Rail Profiles
For inner city, long range cargo and passenger infrastructures

AS22  AS31  AS41  AS47  AS50  AS53
AS60  AS68  ZU - 160  91LB  NZ50

For Switchers and Crossing Asymmetric Rails

UIC33  UIC54  UIC60

Tram Rails

T62

Types of Railway Switchers and Separators

Crossover  Switch Diamond  Three-Way Switch
Switchers - Connecting Links UIC54

**T490 LINE**

1. **Shoulder Milling**
   - Range: Ø20 - 125 mm
   - T490 extended flute cutters with rigidly clamped tangential four cutting edged inserts for machining side track profiles, switchers and separators.

2. **Shoulder Milling**
   - Special T472 tapered extended flute cutters with rigidly clamped tangential four cutting edged inserts for machining top tapered track profiles, switchers and separators.
   - ISCAR offers a standard line of cutters with different approach angels ranging from 22° up to 75°.
Shoulder Milling
Special concave profile extended flute cutters with rigidly clamped tangential inserts for machining top radius profiles, switchers and separators.

Specially Tailored
Shoulder Milling
Special concave profile extended flute cutters with tangential inserts for switcher profiling.

Shoulder Milling
Special T478 extended flute cutters with rigidly clamped tangential positive inserts for smooth cut machining of switchers and separators.
Rough Milling
Special face mount web slotting cutters for machining steel crossings and transition rails made of alloy manganese. The cutter’s positive rake cutting action dramatically reduces forces and improves tool consistency in difficult-to-clamp rail shapes while providing a smooth cut and eliminating hard finishing applications.
**Switchers - Connecting Links**

**Tangential Cutters**
Special concave profile extended flute cutters with rigidly clamped tangential inserts positioned on an angular spindle axis for smooth machining of switchers and separators.

**Switcher/Separator Milling**
Special spherical extended flute cutters with rigidly clamped tangential inserts for machining switchers and separator shoulders. Their unique design, with a combination of left and right flutes, assures minimum vibrations and smooth cutting.

**Tapered Switcher Blade Machining**
Specially tapered extended flute cutters with helical flutes for high metal chip removal and rigidly clamped tangential inserts for machining top tapered track profiles, switchers and separators.
The UIC33 rail is a common part which is produced to keep the wheel in correct alignment when approaching a switch.
**Connecting Links**

**1. Slitting**

Range: Ø100 - 160 mm

Indexable slotting cutters with tangentially mounted inserts and a unique clamping design for durable parting.

**2. Drilling**

Range: Ø12 - 80 mm

Drills with spiral coolant channels and a strong cutter body with excellent resistance to torsion and very efficient chip evacuation.
Shoulder Milling
Special profile extended flute cutters with rigidly clamped tangential inserts for machining switchers and separators.
Shoulder Milling
Special T490 extended milling cutters with rigidly clamped tangential four cutting edged inserts for machining switchers and separator shoulders.

Shoulder Milling
Special or concave profile extended flute cutters with tangentially clamped inserts for machining top and bottom filter track profiles, switchers and separators.
Shoulder Milling
Special T479 tapered extended flute cutters with tangentially clamped inserts for machining switchers and separators and semi-finishing operations.

Shoulder Milling
Special T414 tapered cutters with tangentially clamped inserts for machining top and bottom track profiles, switchers and separators.
1. **Face Milling**
   - **Range:** Ø50 - 315 mm
   - 45° face milling cutters carrying square or octagonal double-sided inserts with 8 and 16 cutting edges for roughing operations at an 8 mm depth of cut.

2. **Deep Shouldering (Contour)**
   - Special T479 full profile cutters for machining switchers and semi-finishing operations.
Slot Milling
Range: Ø25 - 100 mm
H490 is an extended flute cutter characterized by radially clamped double-sided rectangular inserts with 4 helical cutting edges available in 09/12/17 mm sizes.

Profile Slot Milling
Special tangential slot milling cutters for machining profile slots and grooves on rail track connecting links.

Profile Slot Milling
Special tangential slot milling cutters for machining profile slots and grooves on side plates and connecting links.
New Wheel Production

**ISO TURN**

Round inserts and special CAMFIX holders with a screw and top lever for robust clamping.

**SPECIALLY TAILORED**

Special CAMFIX holders with a screw and top lever for roughing and finishing boring operations.

**SPECIALLY TAILORED**
1. Roughing Application
2. Finishing Application
3. Finishing Application
4. Rough Rim Turning
5. Roughing and Finishing Combi-Bore
Round Inserts
For Roughing and Finishing Operations and Machining Rim and Web Areas

RCMT 20-14 (MO)
Screw Clamped Insert

RCMT 25-SR (MO)
Screw Clamped Insert

RCMT 25-NR (MO)
Screw Clamped Insert

RCMX 32-SE50 (00)
Lever Clamped Insert

RCMX 32-WKR (00)
Lever Clamped Insert

RCMX 32-NR (MO)
Screw Clamped Insert

RCMX 32-NR (00)
Lever Clamped Insert

RCMX 32-SE50 (00)
Lever Clamped Insert

RCMX... (00) - Lever Clamping
RCMX... (MO) - Screw Clamping (Special Holder)
RCMT... (MO) - Screw Clamping
Cutting Data

<table>
<thead>
<tr>
<th>Speed</th>
<th>P</th>
<th>Grade Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>IC5005</td>
<td>A TiC/Al2O3 multilayer, CVD coated grade. Used for grooving and turning gray and nodular cast iron at medium to high cutting speeds.</td>
</tr>
<tr>
<td></td>
<td>IC8150</td>
<td>A very hard substrate with a cobalt enriched layer, improved MTCVD TiCN and a thick alpha Al2O3 CVD coating. Features excellent thermal stability, resistance to chipping and plastic deformation. Recommended for high speed machining of steel at stable or slightly unstable conditions.</td>
</tr>
<tr>
<td></td>
<td>TP20</td>
<td>A hard substrate with a cobalt enriched layer, MTCVD TiCN and alpha Al2O3 CVD coating. Excellent thermal stability and resistance to chipping and plastic deformation. Recommended for high speed machining of steel at stable conditions.</td>
</tr>
<tr>
<td>Low</td>
<td>IC8250</td>
<td>A tough substrate with a cobalt enriched layer combined with improved MTCVD TiCN and a thick alpha Al2O3 CVD coating. Recommended for general use machining of steel in a wide range of conditions, featuring high toughness and resistance to chipping and plastic deformation.</td>
</tr>
</tbody>
</table>

Cutting data by area:

<table>
<thead>
<tr>
<th>Area</th>
<th>Vc</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>70 - 200 m/min</td>
<td>0.5 - 2.0 mm/rev</td>
</tr>
<tr>
<td>B</td>
<td>50 - 100 m/min</td>
<td>0.5 - 1.5 mm/rev</td>
</tr>
</tbody>
</table>

Depth of cut according to chipbreaker geometry:

<table>
<thead>
<tr>
<th>Material</th>
<th>Cutting speed: Vc=50-200 m/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>0.3 - 3.5 mm</td>
</tr>
<tr>
<td>SR/NR</td>
<td>1.5 - 7.0 mm</td>
</tr>
<tr>
<td>SE50/WKR</td>
<td>3.0 - 12 mm</td>
</tr>
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</table>

In case of worn wheels with skid flats, built-up and shelled tread or thermal cracks, reduce the cutting speed to ISCAR’s recommended minimum speed. High carbon wheels should be machined at ISCAR’s recommended low range cutting speed. Feeds should be optimized within the recommended range per chipformer and actual chip formation.
Rough Turning
Tools with two cartridges and tangentially mounted inserts for re-turning railroad wheels are able to machine the entire outer wheel profile in a single cut.

Longitudinal turning is performed with a 30 mm long and 4 mm corner radius tangentially clamped insert, positioned with its long side against the machining direction. This insert can handle large cutting depths for roughing or semi-finishing applications, depending on the outer wheel condition.

Machining depth can range from 0.3 mm to 12 mm depending on the outer wheel condition prior to re-conditioning. Large depths of cut are usually performed by several machining paths in order to prevent heavy loads and poor insert life.
Rough Turning

A 19 mm long and 4 mm radius tangentially clamped insert positioned perpendicularly to the larger insert is used to machine the massively eroded rim zone.

Railroad car wheel re-turning can be found in every country where trains are used for passenger or freight transportation. It is most common for wheels to be re-turned on a dedicated portal wheel, universal lathe or under floor lathes.
Re-Turning Rail Wheel

Conventional Wheel Lathe

CNC Portal Wheel Lathe
Toolholders and Cartridges for Under Floor Re-turning Lathes (Model 106 Thread Profile Machine)

Assembly and Spare Parts

<table>
<thead>
<tr>
<th>Designation</th>
<th>Screw</th>
<th>Lever</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNMX 191940</td>
<td>SR LCS 5</td>
<td>LR 5</td>
<td>HW 3.0</td>
</tr>
<tr>
<td>LNMX 301940</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PRWR/L 177-CA-19
PRWR/L 175-CA-19
PRWR/L 175-CA-30
One of the common problems in wheel re-turning is chip formation during the back turning operation at the rim zone.

The WM chipformer (on the 30 mm insert) has been specifically designed to prevent long chip formation during rim turning.
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<tr>
<td></td>
<td>IC9150: A hard substrate with a cobalt enriched layer, MTCVD TiCN and alpha Al2O3 CVD coating. Excellent thermal stability and resistance to chipping and plastic deformation. Recommended for high speed machining of steel at stable conditions.</td>
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<th>Vc</th>
<th>f</th>
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<tbody>
<tr>
<td>A</td>
<td>30 - 70 m/min</td>
<td>0.3 - 1.8 mm/rev</td>
</tr>
<tr>
<td>B</td>
<td>50 - 100 m/min</td>
<td>0.5 - 2.0 mm/rev</td>
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**Depth of cut according to chipbreaker geometry:**

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<th>Chipbreaker</th>
<th>Depth (mm)</th>
</tr>
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<tbody>
<tr>
<td>WF</td>
<td>0.3 - 3.5 mm</td>
</tr>
<tr>
<td>WM/WMR</td>
<td>1.5 - 7.0 mm</td>
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High carbon wheels should be machined at ISCAR’s recommended low range cutting speed. Feeds should be optimized within the recommended range per chipformer and actual chip formation.

**Cutting Data Recommendations**

- In case of worn wheels with skid flats, built-up and shelled tread or thermal cracks, reduce the cutting speed to ISCAR’s recommended minimum speed.

- High carbon wheels should be machined at ISCAR’s recommended low range cutting speed. Feeds should be optimized within the recommended range per chipformer and actual chip formation.
Under floor, counter-wheel machining is intended for re-profiling locomotive wheels without the need to remove the wheels.

Under Floor Wheel Milling

Locomotive Re-Profiling Wheels

Capable of simultaneously re-profiling both left and right wheels and provide high profile accuracy, preserving the dimensions of the wheels under various conditions.
Special-type extended flute cutters carrying accurate round inserts for re-profiling locomotive wheels. Recommended for under floor machining.

RPMW 1609-PP-TM
Turning Rail Car Wheel Axles

DOVEIQTURN
HEAVY DUTY LINE

1

External Turning (Roughing)
A line of external and internal tools and large-sized inserts for heavy duty applications.

2

External Turning (Semi-Finishing)
Double-sided trigon wiper inserts for high surface finishing at high feed rates.

3

New Axles

4

Reconditioned Axles

5
**External Grooving**

ISCAR groove-turn tools [GRIP] offer a surface quality far superior when turning with standard ISO tools as compared to grinding operations.

**Semi-Finishing**

55° positive flank inserts for machining low carbon steel; recommended for semi-finish and finishing operations.

**Drilling**

Range: Ø6 - 32.9 mm

The SUMOCHAM drill family is the most productive and profitable solution in the hole making industry.
Machining Bogie Frames, Side A+B

**Face Milling**
Range: Ø50 - 315 mm.
Cutter: SOF45 D...-R18
Insert: S845 SNMU 1806ANR-MM
Insert: ONMU 070610-TR-MM
Helido 45° face milling cutters carry square or octagonal double-sided inserts with 8 and 16 cutting edges; recommended for roughing operations at an 8 mm depth of cut.

**Shoulder Milling**
Range: Ø50 - 160 mm.
Cutter: S890 FSN D...- R13
Insert: S890 SNMU 1305 PNTR
Helido S890 face mills with square double-sided inserts; recommended for general milling applications at a 9 mm depth of cut.

**Drilling**
Range: Ø6 - 32.9 mm
The SUMOCHAM drill family is the most productive and profitable solution in the hole making industry.
**Rough Shoulder Milling**

Range: Ø25 - 100 mm

P290 is a family of extended flute cutters carrying inserts with 2 serrated cutting edges for rough and finishing operations and high overhang machining. The HL straight edged inserts are recommended for finishing operations.

**Shoulder Milling**

Range: Ø25 - 250 mm.

Cutter: T490 ELN/FLN D...-13

Insert: T490 LNMT 1306 PNTR

The HELITANG T490 Line is recommended for shouldering and slotting operations at a 12 mm depth of cut.

**Drilling**

Range: Ø12 - 80 mm

Drills designed with spiral coolant channels and a strong cutter body with excellent resistance to torsion and very efficient chip evacuation.
1. **Rough Shoulder Milling**
   - **Range:** Ø125 - 315 mm
   - 65° face milling cutters carrying tangentially clamped inserts with four 22 mm long cutting edges.

2. **Slot Milling**
   - **Range:** Ø80 - 250 mm
   - Tangential slot milling cutters with cartridges carrying LNET12... tangential inserts with 4 cutting edges.

3. **Deep Shoulder Milling**
   - **Range:** Ø20 - 125 mm
   - Extended flute cutters carrying T490 LNHT/MT 08/13... tangential inserts with 4 cutting edges for higher productivity.
Drilling and Chamfering
Special request indexable head drills with coolant holes.

Deep Drilling
Range: Ø5 - 10xD
Solid carbide drills with coolant holes and a drilling depth of 20xD.

Thread Milling
Range: Ø4 - 20 mm
Solid carbide 3 flute threading endmills with a short 3-tooth cutting zone and a released neck for the production of small internal threads.

Drilling and Chamfering
Special request indexable head drills with coolant holes.
Face Milling (Finish)
Special face milling cutters with adjustable cartridges carrying 16 cutting edged inserts for finishing operations.

Deep Drilling
Range: Ø25 - 65 mm
Deep drills for milling centers and lathe machines with a drilling ratio of up to 7x D.
**BAYOT-REAM**

**High Feed and Speed Reaming**

**Range:** Ø11.5 - 32 mm

Interchangeable solid carbide reaming heads with a quick change bayonet mechanism; recommended for high productivity and accuracy.

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**MILLTHREAD**

**Threading**

**Range:** Ø12 - 40 mm

Internal thread milling and external precision thread milling on CNC machines by use of helical interpolation performed with NC programming. MILLTHREAD milling cutters, in addition to solid carbide cutters, are available with indexable thread milling inserts for any standard thread profile.
Drilling and Countersinking
Spiral diamond tipped drills for countersinking and drilling in one step.

Drilling
Micrograin carbide endmills with a diamond coating for longer tool life and lower tangential forces which eliminate delamination.

Milling
EPNC Diamond coated drilling and milling tools with right and left spirals for rough trimming.
**Milling**

**High speed adjustable endmills**
carrying ADKW 150508 PDR PCD tipped inserts, with excellent axial runout, for face milling.

**Diamond coated** carbide endmill with right and left spiral flutes for side milling.

**Milling**

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