# WELCOME TO ISCAR'S WORLD

VER 1 - 2019

**Parting 4 Productivity with LOGIQ-F-GRIP**
A revolutionary system integrating a comprehensive range of highly effective parting and grooving solutions [p. 4]

**Fast Feed Milling Tools For High Metal Removal Rates**
Four new Fast Feed tool families and existing line upgrades have been developed to maximize efficiency [p. 16]

**Exchangeable 3 Flute Head Drills**
The new LOGIQ3CHAM family, designed to significantly increase productivity and reduce machining cycle time [p. 22]

**Making Tracks: New Cutting Tools for the Railway Sector**
ISCAR's projects for this key sector incorporate essential elements to fulfill the need for layout solutions and efficient productivity [p. 34]

ISCAR
INDUSTREALIZE
IDEAS BECOME REALITY

Member IMC Group
www.iscar.com

# ISCAR's Electronic Catalog Features INDUSTRY 4.0 Milling Tool Assemblies Online

www.iscar.com

SCAN ME


Member IMC Group

www.iscar.com

# Table of Contents

# PARTING 4xFASTER with LOGIQ-F-GRIP

**Always at the cutting edge of developments in the field of cutting tools, ISCAR introduces a revolutionary system for parting and grooving operations.**

Parting and grooving are essential aspects of the turning process and the metalworking industry faces a constant challenge to integrate methods that will increase efficiency and decrease downtime for these popular operations.

ISCAR fully understands the importance of parting and grooving operations in the turning process and that multiple factors need to be considered for every application, including machine tool selection, the type of material being parted/grooved, required depth of cut, and feed and speed rates. ISCAR has responded to these complex needs by developing a comprehensive range of highly effective parting and grooving solutions that include an extensive choice of insert geometries, chip breakers, and carbide grades - and the range continues to expand.

With Industry 4.0 demands and standards fueling industry development at extraordinary rates, ISCAR has introduced new parting and grooving technologies capable of integrating seamlessly with the new wave of machining centers that work with incredibly high speeds and feeds. **LOGIQ-F-GRIP** has been designed to answer these needs and to achieve high productivity and lower costs.

# PARTING 4x FASTER

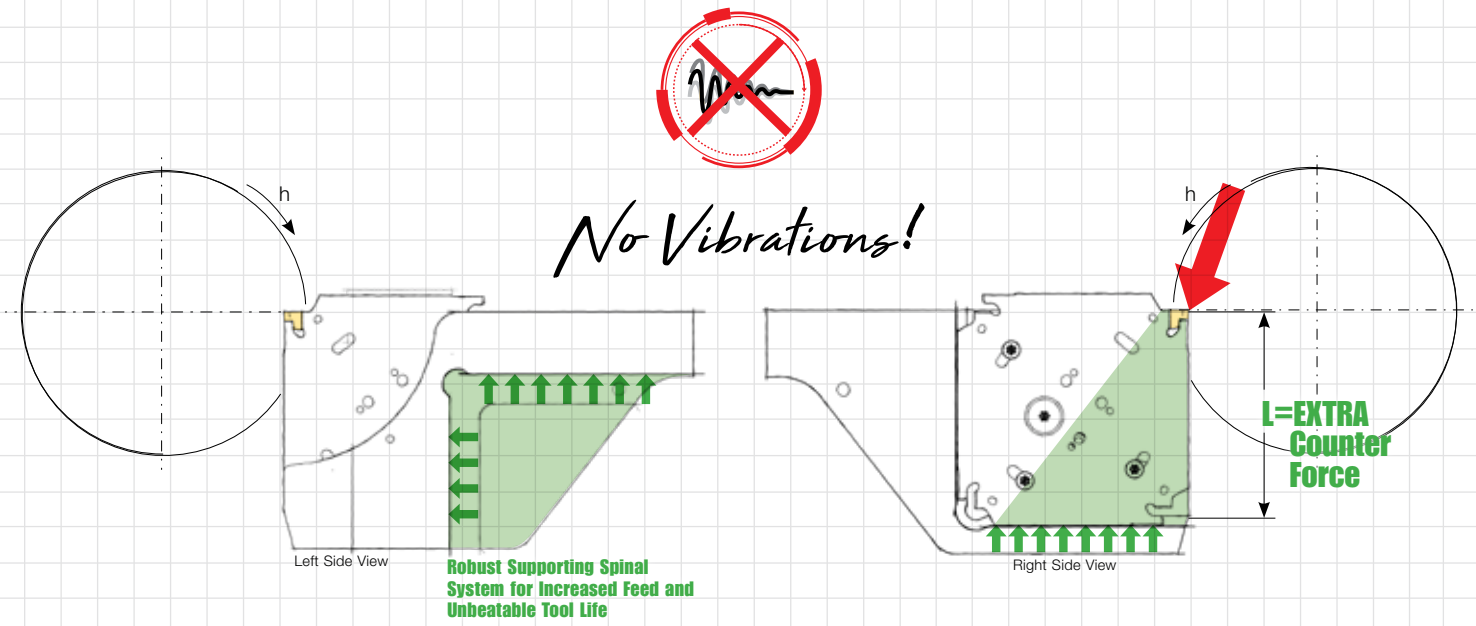
**P**ockets
**P**rofitability
**P**roductivity
**P**erformance


TANGFGRIP HIGH FEED PARTING

DOFGRIP TWISTED 2-SIDED

# Reinforced and Robust Tool Provides Extra Stability and Higher Productivity

TANG F GRIP
HIGH FEED PARTING




A revolutionary parting system designed for increased productivity, **LOGIQ-F-GRIP** comprises a robust tool block carrying square blades that feature four pockets, with a unique parting concept capable of parting off up to 120mm bar diameter to optimize performance.

**LOGIQ-F-GRIP** is simple to mount and operate on all machine types, including multi-task and machining centers on X-AXIS, without any need for special adjustment. The system enables the mounting of both **TANG-F-GRIP** and **DO-F-GRIP** blades on the same blocks.

The square blades possess a support system that provides totally vibration-free grooving and parting. **LOGIQ-F-GRIP** also saves on setup time as, in cases of pocket damage, the block's configuration allows a blade to be rotated to a new pocket without setup.

**TANG-F-GRIP** is intended for high feed parting. It extends insert life, improves surface finish and part straightness, and features high stability - especially when parting large diameters. The new patented blades reduce cutting time which leads to material savings - for instance, a 120mm bar can be cut with a 3mm blade with HF (high feed) inserts at a feed rate of up to 0.4 mm/rev (.0157ipr).

The HF tangential single-ended insert was developed to enable highly efficient parting at very high feed rates, by use of a unique chipformer technology. A secure clamping design uses a tangentially orientated pocket to facilitate pocket life that is three times longer than that of any other conventional self-grip system. This robust clamping method enables machining at high feed rates and provides excellent straightness and surface finish characteristics, while the flat top configuration prevents chip obstructions under all possible machining conditions. The HF insert features a new insert chipformer to allow unobstructed chip flow, which increases insert and blade tool life and leads to very high productivity gains.

TANGFGRIP HIGH FEED PARTING


The **DO-F-GRIP** DGN double-sided twisted parting insert provides the largest choice of parting widths available in today's market, covering all application ranges. ISCAR offers a wide variety of chipformers and the most advanced grades to ensure unbeatable performance and extended tool life, even when machining exotic materials.

When machining materials such as stainless steel or high temperature alloys, the temperature near the cutting edge area becomes extremely high. In addition, these material types tend to adhere to the tools cutting edge, causing built-up edge. These problematic phenomena can be moderated by targeting high pressure coolant directly to the cutting zone.

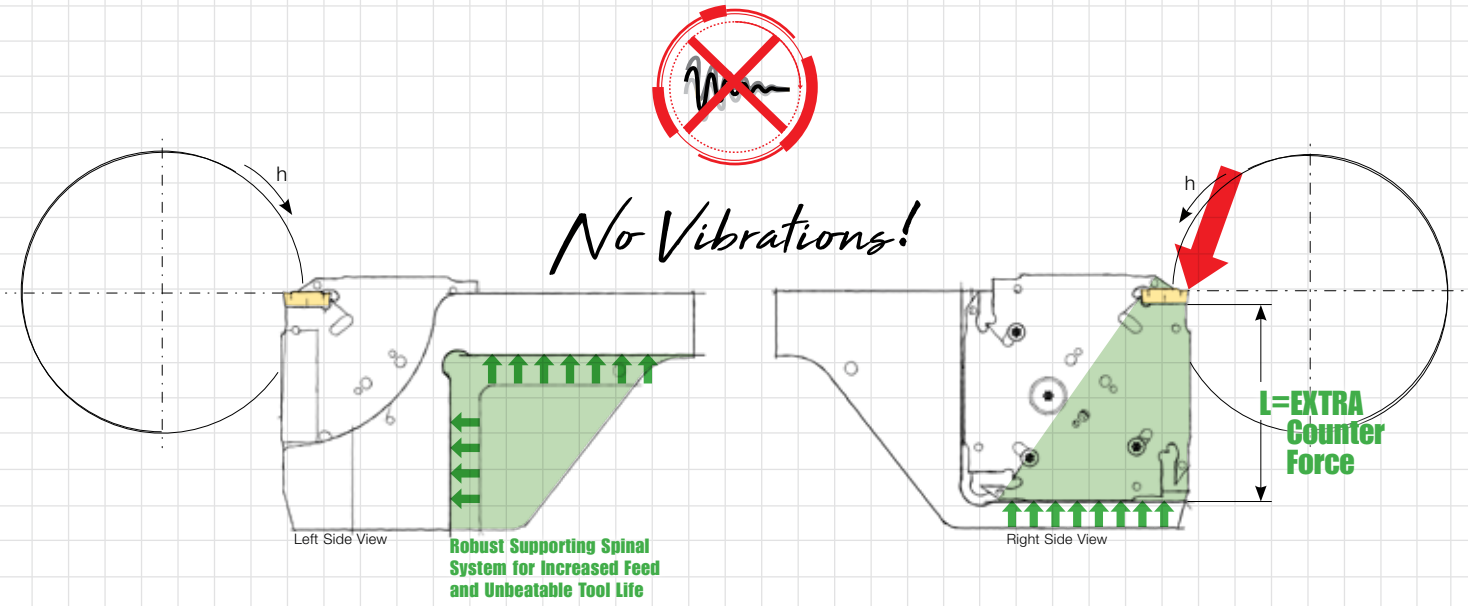
The **JETCUT** system incorporates ingeniously designed through coolant channels to deliver coolant close to the cutting edge, which improves chip formation and slashes flank and cratering rates.

ISCAR maintains its unrelenting progress as a result of the company's continuous development of innovative, high-quality products, based on the expertise of the company's R&D Department and prompted by the evolving needs of global industry. This desire to provide customers with the very latest, most efficient metal cutting technology is reflected in the introduction of **TANG-F-GRIP** solutions to ISCAR's comprehensive GRIP range of parting and grooving tools.

DOFGRIP
TWISTED 2-SIDED

# Reinforced and Robust Tool Provides Extra Stability and Higher Productivity

## DOFGRIP
TWISTED 2-SIDED




# LOGIQ Tooling Solutions for Oil and Gas Applications

**The oil and gas industry has suffered considerably over the past years, due to the global economic crisis that left the major manufacturing players - both from the upstream and downstream sectors - having to meet low market requirements for new reserves, while cutting severely their workforce, machinery output and further development.**

A positive shift in 2017 set new demands from well-known offshore deep-water oil and gas exploration companies for rig components such as pressure heads and valves, Xmas-tree and wellhead valves, and manifolds, which all are made from or with nickel-based exotic materials that can resist extreme conditions such as high-low temperatures, high pressure, and most - if not all - abrasion and corrosion side-effects.

To meet the call from oil and gas component producers for increased productivity and goods output while maintaining a high degree of quality, reliability and safety in the manufacturing process with a low rate of reject parts, ISCAR has developed a wide range of innovative tooling solutions that are designed to simplify production, reduce costs, and maximize productivity in this challenging sector.

# MACHINING INDUSTRY 4.0 INTELLIGENTLY

**JETCUT Parting Technology**

The **JETCUT** line provides advanced parting technology for welded and seamless steel pipes at the OCTG (Oil Country Tubular Goods) industry. The **JETCUT** high-pressure coolant nozzle outlet is pinpointed to the cutting zone, to extend insert edge life and eliminate built-up edge while cutting heat resistant alloys as well as stainless steels. In addition to improving chip control at higher cutting speed rate, the self-clamping parting off system reduces setup and machine downtime with favorable improvement in machining time.

JETCUT

WHISPERLINE ANTI-VIBRATION

**WHISPERLINE – Anti-Vibration Boring Bars with Exchangeable Heads**

ISCAR's **WHISPERLINE** anti-vibration boring bars were designed to significantly reduce and even eliminate chattering - vibrations - when working with extended overhangs in turning, boring and grooving operations with length ratios of 7xD to 14xD diameter. The anti-vibration boring bar system integrates with several types of indexable head configurations, with a "live" inner dampening mechanism that can be applied on standard lathes, VTL and multi-tasking mill-turn or turn mill machines for large scale parts including manifolds, valves, wellhead, coupling and tubing components. These factors enable increased productivity and improved surface quality while using pinpointed internal coolant technology to the insert's cutting edge with improved chip control and edge life for high quality finishing operations.

**SUMOCHAM ICG Chip Splitting Drilling Heads**
ISCAR's **SUMOCHAM** ICG geometry is recommended particularly for deep drilling operations when chip evacuation can be a problem. The drilling heads are designed with a chip splitting notch technology to create short and narrow chip segments, which can easily be extracted out of the hole through the drill spiral flute and the use of internal coolant. Made with a high wear resistant nano-coated grade to ensure hole surface quality and accuracy in steels, stainless steel and high nickel-based materials, the ICG heads can be mounted on any **SUMOCHAM** standard drill body with the appropriate pocket size, at diameters ranging from 14 to 25.9 mm, ensuring IT9-IT10 hole tolerance.

SUMOCHAM
CHAMDRILL LINE

TANG4FEED
HI-FEED MILLING

**TANG4FEED for High Feed Milling**
Producers of oil and gas exploration equipment such as frac pump fluid ends used in hydraulic fracturing procedures, BOP (blow out preventers) and valve blocks, have shown great interest in the high feed milling solutions offered by ISCAR.
The latest addition to a wide range of feed mill technologies, **TANG4FEED** is a family of high feed shell mill cutters carrying tangentially clamped rhombic inserts with 4 cutting edges. **TANG4FEED** cutters are designed for milling rough/semi-finish and sculptured surfaces, in diameters ranging from 40 to 100 mm, with up to 1.5 mm depth of cut. These unique features provide a good ramp down and side plunging capability with excellent chip flow and a high metal removal rate, due to a small entrance angle that enables high table feed at shallow depth of cut and materials that are machined on oil and gas exploration equipment.

**Customized Tooling for Seal Ring Grooves**

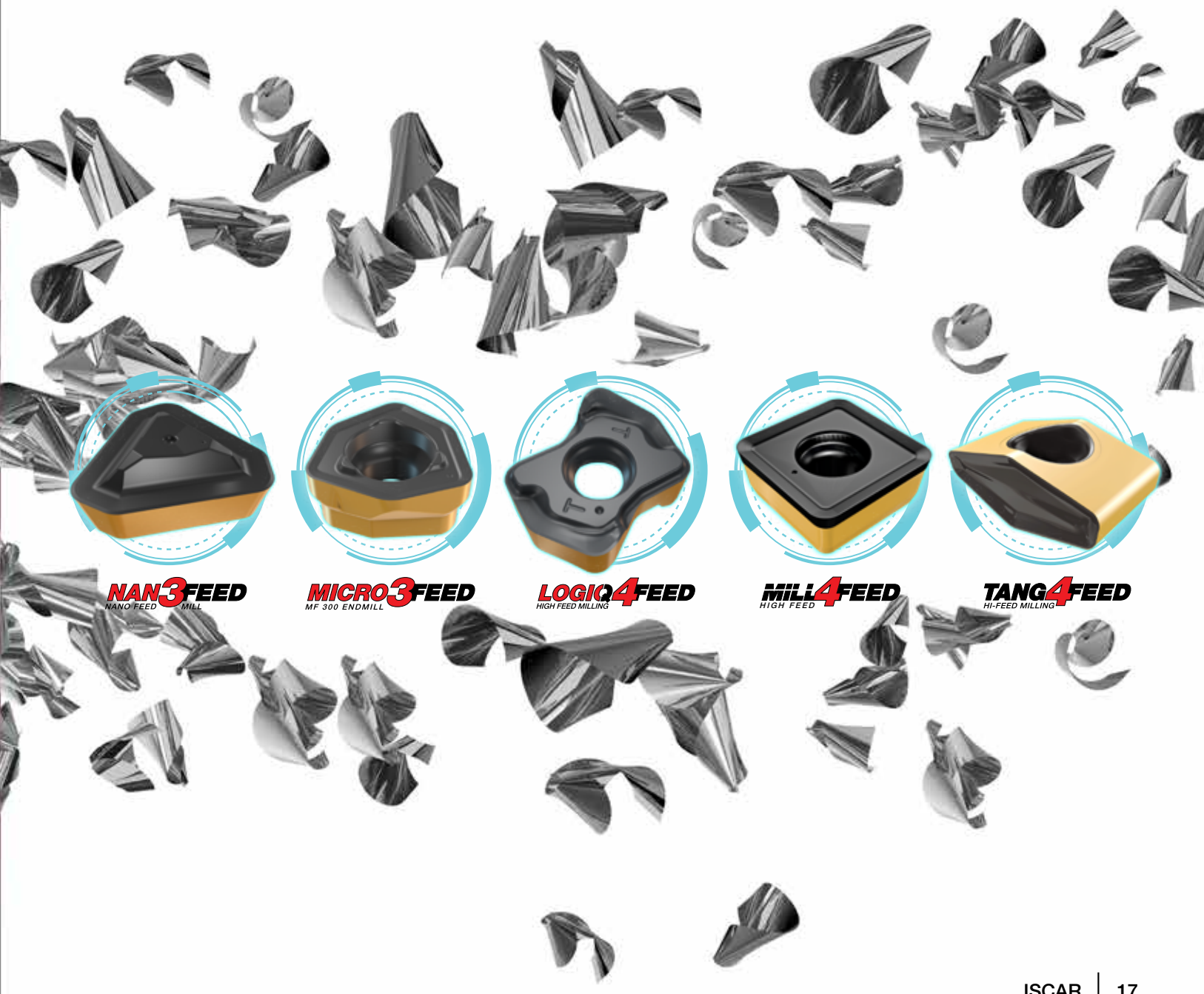
The most common operations on valve bodies, valve blocks, valve seats and bolt holes, fluid ends and manifolds are seal ring grooves, which are typically produced on challenging materials such as duplex, stainless steels and Inconel-based components. Seal ring grooves are an example of a component featuring precise dimensions and high-quality surface finish. The sealing areas in API threads are comparatively small with limited contact areas that need to hold the required sealing pressure. Secure and stable machining is essential to ensure a smooth, flexible and efficient process.

To withstand the unknown variables that affect the global oil and gas market, ISCAR works closely with its leading oil and gas customers to continue to develop innovative, efficient, productive and cost-effective solutions.

# FAST FEED MILLING Tools For High Metal Removal Rates

The method of rough machining with significantly increased feed per tooth – known as fast feed (FF) milling or high feed milling (HFM) – found its industrial application in the 1990's. Die and mold making was one of the first industries to adopt HFM into its production practices, following a massive increase in customer demands for reduced die and mold manufacturing time.

**The FMR method is based primarily on two principles: the geometry of a milling cutter and the high-speed feed drive of a machine tool.**
A typical fast feed tool features a small cutting edge angle, normally 9-17°. This design characteristic results in three important outcomes. The first is the possibility of considerably increasing feed per tooth due to a chip thinning effect. For example, in face milling low-alloy steel, 0.2 mm/tooth (.008 ipt) is a near maximum value feed, but high feed milling the same material with a 2 mm/tooth (.08 ipt) feed is normal. The second is a shallow depth of cut (DOC) that ensures this geometry for the tool. Milling with reduced DOC diminishes cutting force and power consumption. And the third point relates to minimizing the radial component of the cutting force combined with maximizing its axial component, which acts toward the axis of the machine tool spindle, i.e. the direction of the maximum machine tool rigidity. This improves machining stability.
Increasing feed per tooth means greater feed speed that requires the appropriate feed drive of the machine tool. In the above example of high feed milling low-alloy steel, the feed speed may be 7000-9000 mm/min (275-355 ipm) – the next-higher order versus conventional values.
Introducing FMR substantially changed the concept of rough milling. Instead of intensive material removal at large depths and width of cut by using high-power machines, the method proposed extremely productive milling at shallow depths by low-power machines fitted with a cutting tool that runs very fast.



## In its latest “LOGIQ” campaign, ISCAR introduced four new Fast Feed tool families and upgraded several existing lines

The fast feed milling method has since undergone some interesting changes. Originally considered as an effective way for rough machining cavities and pockets that was typical for die and mold making, FMR soon proved advantageous in face milling (“fast feed facing” or “triple F”). The diameter range of the FF milling cutters was increased and the group of engineering materials suitable for cutting by the FMR method, expanded. Steel and cast iron may be known as the main “consumers” of fast feed milling, but stainless steel, titanium, and even high temperature superalloys can be successfully machined by the method as well. This in turn led tool manufacturers to introduce a variety of fast feed milling cutters in different forms. Indexable or solid in concept, they can have shank or arbor type design configurations, integral or modular body structures, and cutting geometry that varies according to the machined material group.






ISCAR's line of high feed milling cutters illustrates this diversity with almost dozens of fast feed mill families; today it is unique in the field with an extensive range of options. Already in the late 90's, the company introduced a family of indexable tools with one-sided inserts for fast feed milling, and continued to expand their line by adding more indexable milling families, with designs that provided added value to customers. In one case, the tools carried cost-beneficial double-sided inserts; in another, an advanced cutting geometry considerably improved ramp-down abilities for better performance in milling by helical interpolation. For applications requiring small-size cutters, the company developed FF solid carbide endmills and replaceable milling heads for the company's "Multi-Master" products. Efficient use of FMR tools in face milling operations generated new demands, and the company not only introduced appropriate cutter families but suggested an original additional solution: the specially designed inserts. These inserts, intended for mounting in general-purpose cutters in the standard milling line, transform the latter to FF tools.

In its latest **LOGIQ** campaign, ISCAR introduced four new FF tool families and upgraded several existing lines.

The first noticeable feature of the new families is a substantial decrease in the size of indexable FF cutters. For example, the diameter range of FFT3-02 **NAN3FEED** endmills is 8-10 mm (.315-.394") – "classical" dimensions for solid carbide tools. These endmills are characterized by the original clamping method of miniature carbide inserts. The inserts do not have a traditional central through-hole that weakens the insert structure. A screw head, which acts as a wedge, secures the insert allowing insert indexing to be quick and simple. As the insert is very small in size, it is placed in the pocket via a key with a magnetic boss on the key handle. The design ensures a multi-tooth tool configuration: 2 and 3 teeth for diameters 8 and 10 mm (.315-.394") correspondingly; and 3 indexable cutting edges of the insert provide cost-effective using cemented carbide.

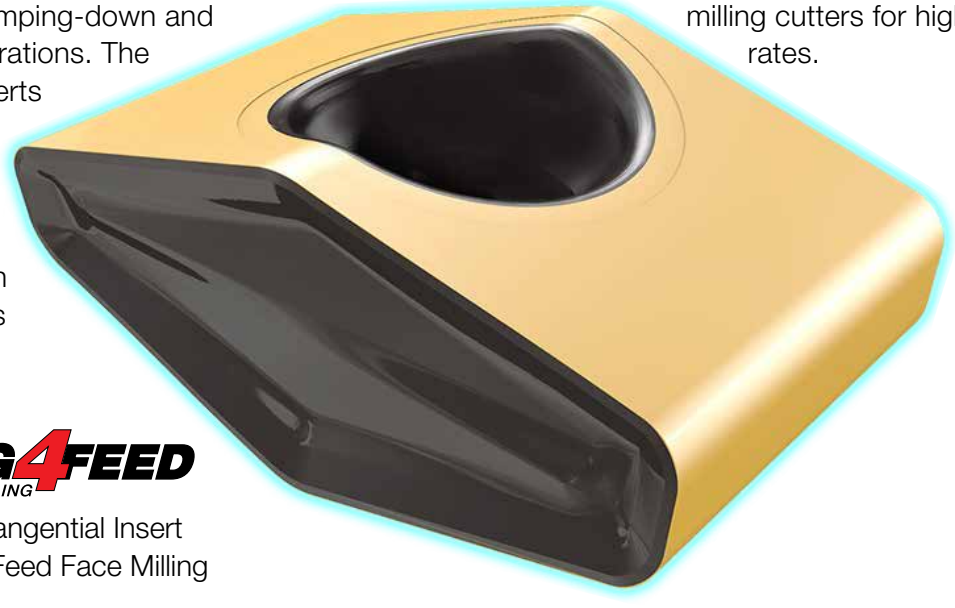
NAN3FEED
NANO FEED MILL

Smallest Indexable Insert
for High Feed Milling

**TANG4FEED** is a family of fast feed shell mills carrying tangentially clamped rhombic inserts. The mills are designed mostly for rough machining medium- and large-size cavities and pockets. The tangential clamping principle, combined with a dovetail profile of matching surfaces for secure insert mounting, ensures a durable mill structure. The insert's rhombic shape significantly improves mill performance in ramping-down and side-plunging operations. The **TANG4FEED** inserts are double-sided, resulting in 4 cutting edges.

The inserts of both mentioned families are provided in several cutting geometries for optimal milling of different engineering materials.

Developing FF milling cutters is still far from its high point, though the newly introduced tool families offer logical answers to real manufacturer demands. FMR, as a productive method of rough machining, has optimistic prospects, and the metalworking industry will continue to require faster and faster milling cutters for high metal removal rates.



TANG4FEED
HI-FEED MILLING

Unique Tangential Insert
for High Feed Face Milling

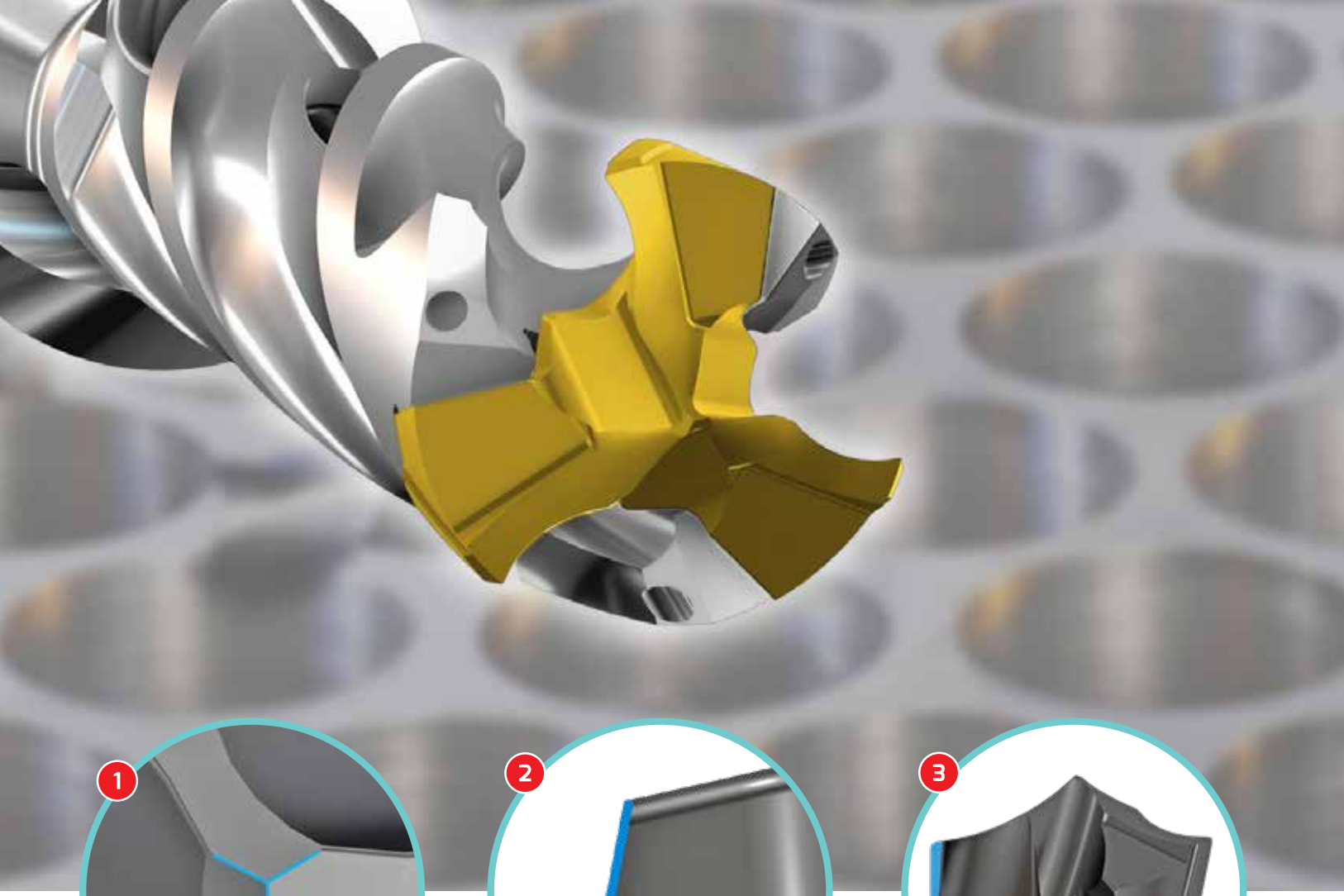
# Exchangeable 3 Flute Head Drills

ISCAR introduces the new LOGIQ3CHAM drill family to raise drilling performance levels to new heights, featuring three-flute exchangeable drill lines designed to significantly increase productivity and reduce machining cycle time by up to 50% compared to conventional two-flute drills.

This new family was developed by utilizing highly advanced technologies based on ISCAR's successful **SUMOCHAM** drill families. The diameter range is 12 to 25.9 mm with drilling depth to diameter ratios of 1.5XD, 3XD and 5XD.

The new D3N drills can increase productivity by 50%, maintaining the excellent performance of the **SUMOCHAM** drills.

**LOGIQ3CHAM** applies the user-friendly drilling system for easy handling in accordance with the company motto of "No Set-up Time".











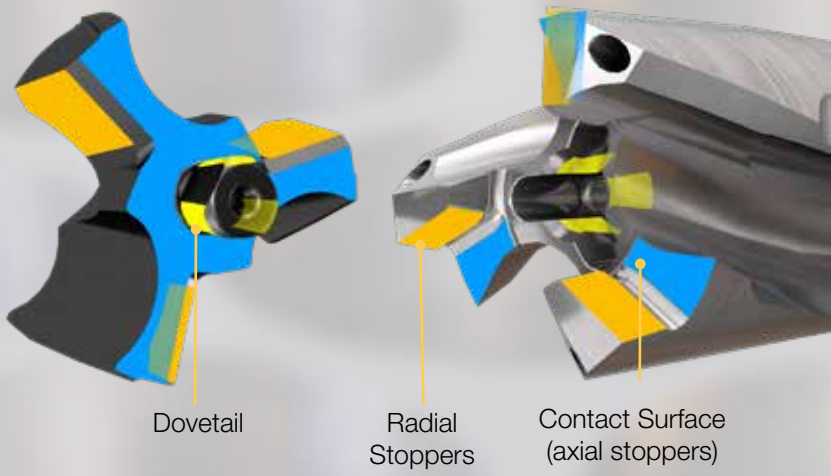

**H3P Drilling Heads**

- Available in the drilling range of 12-25.9 mm diameters with 0.1 increments
- Single type geometry suitable for both ISO P and ISO K materials
- H3P drilling heads are made from IC908 TiAlN PVD nano layer coating grade, for prolonged and predictable life
- Unique wavy and honed cutting edges enable best chip form and easy evacuation process
- Patanted concave cutting edges enable smooth penetration, excellent centering and stable drilling process
- Patent-pending robust and precise chisel point and gash angle to withstand high cutting forces
- 15° corner chamfer increases wear resistance and strengthens the cutting corner
- Dovetail clamping prevents the head from being extracted from the pocket during retraction

**D3N Drilling Holder**

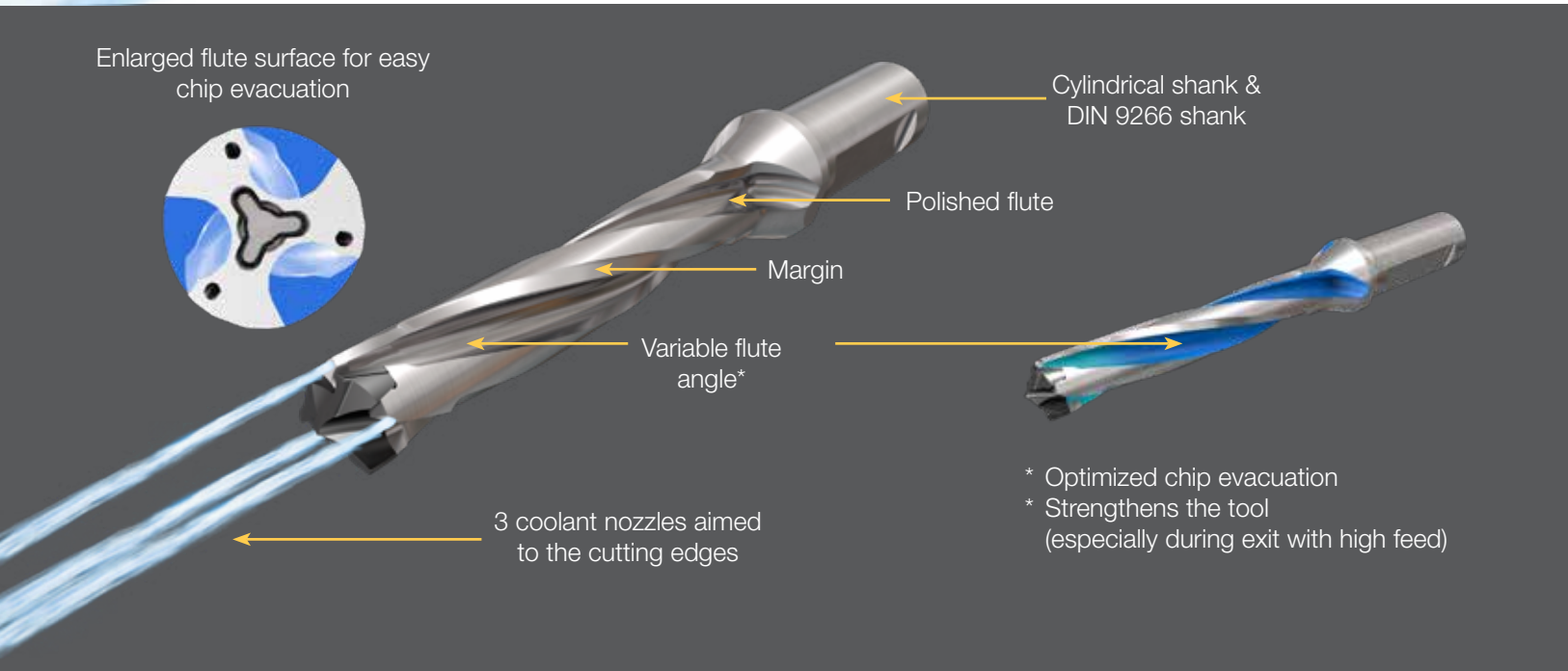
- Available in 1.5, 3 and 5 diameter to drilling length ratios
- 3 high flute helix and polished flute surfaces provide a smooth and easy chip evacuation process
- Helical margin prevents chip adhesion between the body and the hole during machining
- Internal coolant channels supply efficient cooling and lubrication during the drilling process
- Tool body is made from highest grade of steel with superior hardness for high wear resistance
- Drilling head pocket is designed to withstand high machining cutting conditions, allowing easy and fast head indexing
- Variable flute angle design provides durable tool structure to withstand high axial forces

**Patented pocket design**





- For optimal performance, it is recommended to adjust runout of outer points or chisel with a maximum of 0.02 mm
- Large runout will influence drill performance tool life and hole quality
- **LOGIQ3CHAM** drills can be used either on milling centers or lathe machines
- **LOGIQ3CHAM** drills can be used on sloped surfaces up to 12°. When drilling sloped surfaces of more than 12°, reduce feed by 30-50% during penetration of up to 5 mm depth; or use a spot or pre-hole drill to avoid drill deviation or poor drill performance
- Interrupted cut has a direct influence on hole accuracy, quality and drill life
- Includes a new **LOGIQ3CHAM** drill head key




* Optimized chip evacuation
* Strengthens the tool (especially during exit with high feed)


Self Centering Insert

For Steel & Cast Iron

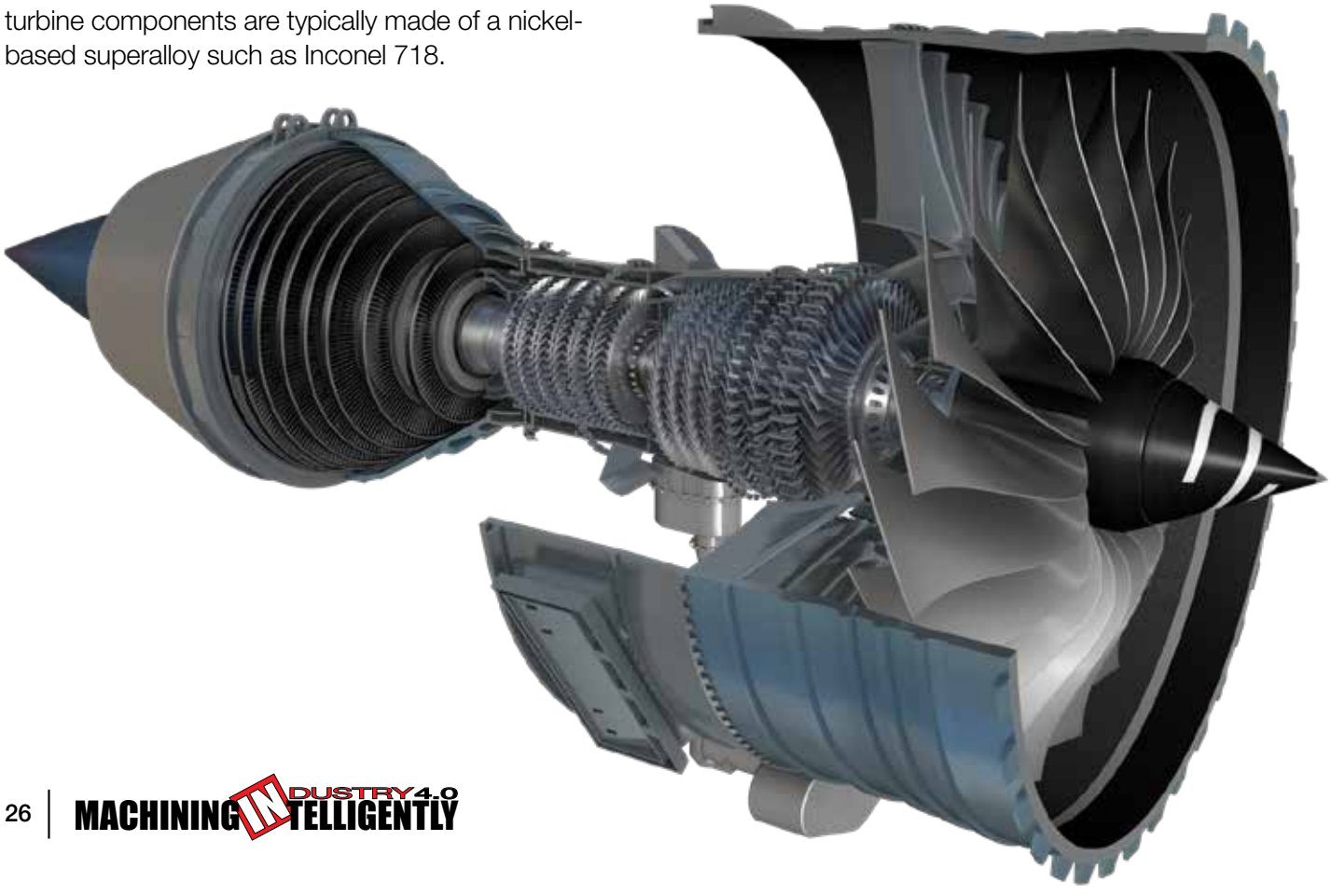

High Productivity

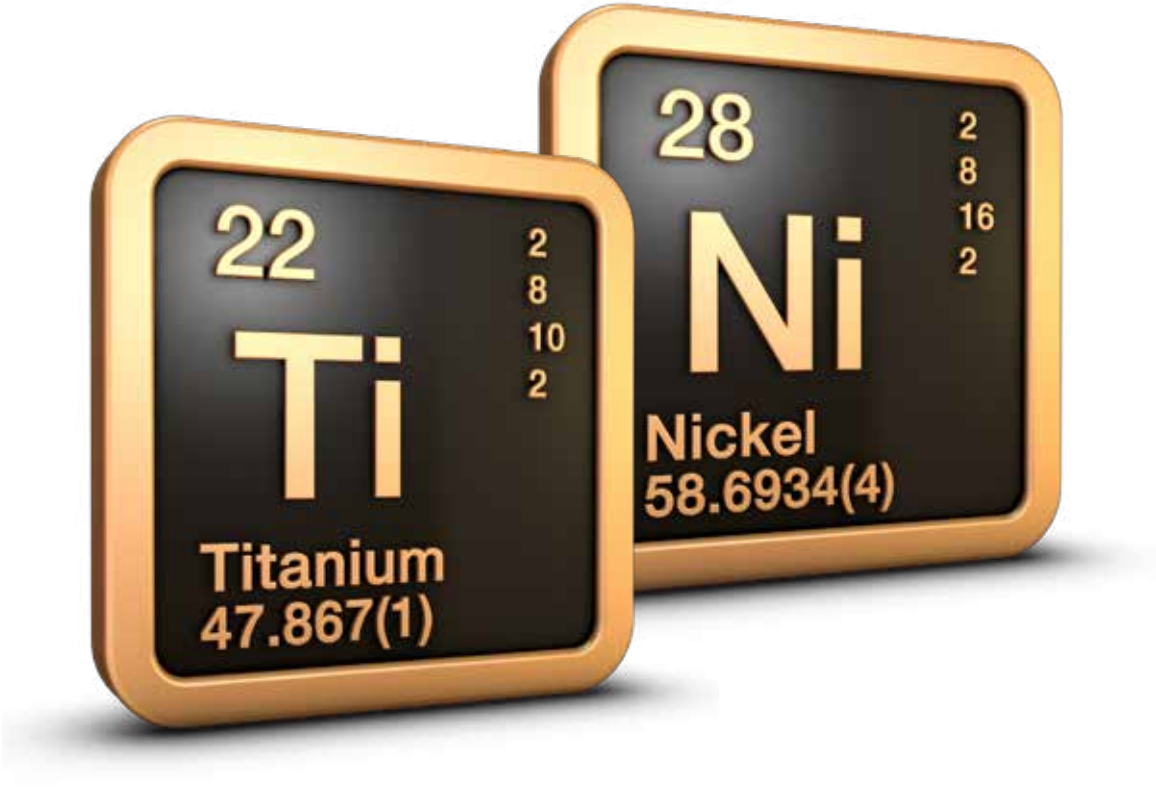

Cost Effective Insert

# Jet Engine Part Production - An Aerospace Industry Challenge

**The requirements for materials used in jet engine parts are necessarily very exacting. They must survive extremes of temperature and force, while being as light as possible and ultra-reliable.**

A turbojet engine can be divided simply into three sections – the compressor, the combustor and the turbine. The compressor pressurizes the air flowing through the engine before it enters the combustion chamber, where the air is mixed with fuel, ignited and burnt. The compressor components are predominantly made from titanium alloys, while the combustor and turbine components are typically made of a nickel-based superalloy such as Inconel 718.






**Nickel-based alloys**

The excellent physical properties that characterize nickel-based high temperature alloys make them ideal for use in the manufacture of aerospace components. Properties such as high yield strength and ultimate tensile strength, high fatigue strength, corrosion and oxidation resistance even at elevated temperatures enable the usage of nickel-based high temperature alloys in many applications and over a very wide temperature spectrum.

The aerospace industry accounts for about 80% of the nickel-based high temperature alloys used in manufacturing rotating parts of gas turbines, including disks and blades, housing components such as turbine casing), engine mounts, and components for rocket motors and pumps.

Nickel-based high temperature alloys contain 35-75% Ni and 15-22% Cr; they constitute about 30% of the total material requirement in the manufacture of an aircraft engine and are also used as structural material for various components in the main engine of space shuttles.

The very same properties that make nickel-based alloys such a great choice for jet engine parts also cause substantial machining difficulties.
The cutting forces and temperature at the cutting zone are extremely high due to the high shear stresses developed and the low thermal conductivity. This, coupled with the reactivity of nickel-based high temperature alloys with the tool material, leads to galling and welding of the chips on the work piece surface and cause excessive tool wear, which can limit cutting speeds and reduce useful tool life.
All these characteristics contribute to low material removal rates and short tool life, resulting in massive machining costs.

**Titanium-based alloys**

Due to their high strength to weight ratio and excellent corrosion resistance, titanium alloy parts are ideally suited for advanced aerospace systems. Titanium-based alloys which contain 86-99.5% Ti and 5-8% Al, are immune to almost every medium to which they would be exposed in an aerospace environment. Very large quantities of titanium can be found in jet engines, where titanium alloy parts make up to 25-30% of the weight, primarily in the compressor. The high efficiency of these engines is obtained by using titanium alloys in components such as fan blades, compressor blades, rotors, discs, hubs, and other non-rotor parts - for instance inlet guide vanes. Titanium's superior properties and light weight allow aeronautical engineers to design planes that can fly higher and faster, with high resistance to extreme environmental conditions. However, titanium has historically been perceived as a material which is difficult to machine due to its physical, chemical and mechanical properties.

The material's relatively high temperature resistance and low thermal conductivity do not allow generated heat to dissipate from the cutting tool, which causes excessive tool deformation and wear. Titanium alloys retain their strength at high temperatures, resulting in relatively high plastic deformation of the cutting tool resulting in depth of cut notches. During machining, the high chemical reactivity of titanium alloys causes the chips to weld to the cutting tool, leading to built-up cutting edges and chip breakage problems.

Over the past few years, ISCAR has invested many resources in R&D to resolve these obstacles and optimize the machining of nickel-based and titanium high temperature alloys, with solutions that include the creation of customized grades and implementation of high pressure coolant technologies to develop cutting tools that will handle the heat issues.

**For high material removal rates, ISCAR developed ceramic grades to facilitate machining nickel-based alloys at cutting speeds of 200 – 400 meters per minute**

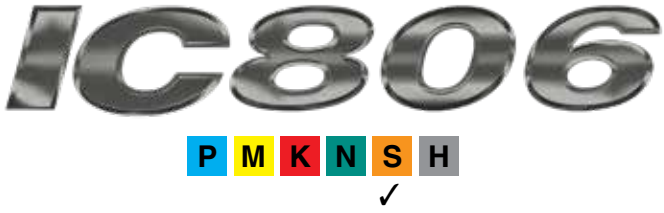

**Newly Designed Box to Protect Inserts**
The new insert box possesses exclusive design characteristics, including a ribbed translucent structure and a single end opening for the lid with a stopper on the box. The box features a two tone color scheme and the tinted gray-colored lid bears the warning notification.
The unique design differentiates and distinguishes ISCAR's insert packages, making our products stand out from the competition.

**IW7** - Whisker-reinforced ceramic grade, provides high hardness with excellent toughness used for roughing and semi-finishing continues operations at 8-10 times faster cutting speeds when compared with carbide grades.



**IS25** - Reinforced SiAlON composite grade, excellent for machining Ni based high temperature alloys at continuous and light interrupted applications

**IS35** - Reinforced SiAlON composite grade, excellent for machining Ni based high temperature alloys at light and heavy interrupted applications.
A series of carbide grades was developed specifically to create tools for machining nickel-based and titanium alloys:

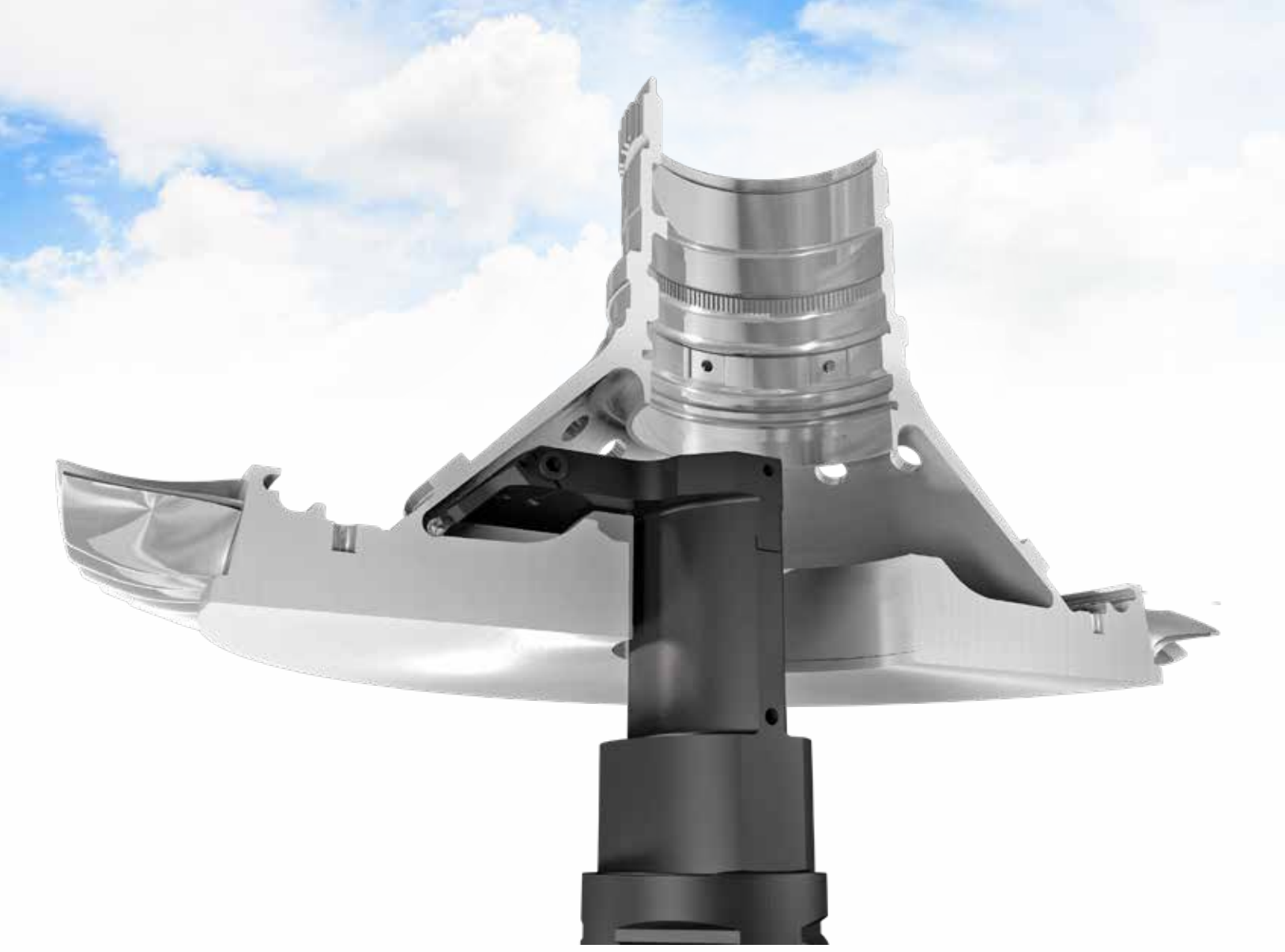




**IC806** - A hard submicron substrate combined with a thin TiAlN PVD coating. The unique coating procedure which involves a special post coating treatment creates a thinner and smoother coating layer providing the insert with the best characteristics suitable for machining nickel-based and titanium alloys.

**IC804** – Same TiAlN PVD coating on a harder submicron substrate designed especially for machining Ni based alloys used in newly designed jet engine parts that feature very high hardness (40-47 HRC).



**IC20** – An uncoated carbide grade which is highly recommended for machining aluminum and titanium. IC20 provides very high performance and is mostly used for continuous cut applications.



**High pressure coolant tools**

Although high pressure coolant features have been in existence for a long time in the metal removal world, today high pressure coolant tools play an increasingly significant role in the machining process, facilitating enhanced productivity and chip control especially for hard to machine materials such as titanium and nickel-based alloys. Incorporating high pressure is the key to directing coolant to exactly where it is needed in order to flush the chips away from the cut. ISCAR was one of the first cutting tool producers to respond to market needs by developing and manufacturing tools for the optimal use of high pressure coolant in lowering high temperatures and regulating chip flow, including **JETCUT** custom high-pressure coolant tools.

While the aerospace parts OEM/PMA sector is under constant pressure to keep costs down, the quality and life expectancy of the parts produced cannot be compromised – and this represents an enormous challenge for all involved. ISCAR's enhanced cutting tools allow jet engine manufacturers to utilize the ideal materials for the production of high quality parts, with minimum wastage and maximum efficiency.

# Making Tracks: New Cutting Tools for the Railway Sector

**The railway industry is one of the main consumers of cutting tools and ISCAR is increasing its role as a supplier of complex projects for this key sector that incorporate essential elements to fulfil the need for layout solutions, efficient productivity, and a reduction in machining time and costs – all demanding a large variety of both standard and tailor-made solutions.**

Machining railway parts represents a challenge for manufacturers and cutting tool producers alike, who must contend with a host of constraints - such as the relatively large size workpieces, complex structures, and complicated final machined profile - along with the need to remove a large volume of material, ensure predictable tool life, and avoid high maintenance costs.
When selecting the correct tools and inserts for each job, certain parameters need to be taken into consideration, for example the type of material to be machined, the condition of the part, the available machine tool, its condition and power characteristics, clamping fixtures, etc.

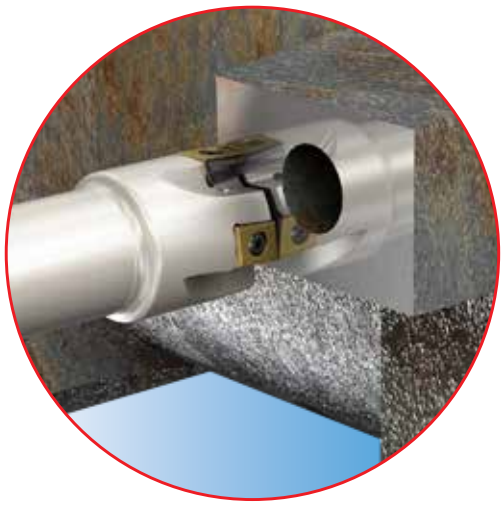
A central factor in optimal tool development is the creation of a virtual manufacturing environment that simulates machining processes and cutting conditions, to ensure that the tools produced will overcome material and manufacturing limitations and that they will provide the best solutions to the specific needs of railway parts producers.

As an example of this dynamic, it is useful to consider how new tools and processes are adapted to machine bogie components and switchers. The bogie frame is utilized in each of the three main categories in the railway sector: urban transit rail, passenger rail, and freight rail. The switcher is one of the most common parts produced, with typical switchers including crossover, switch diamond, and three-way switch.

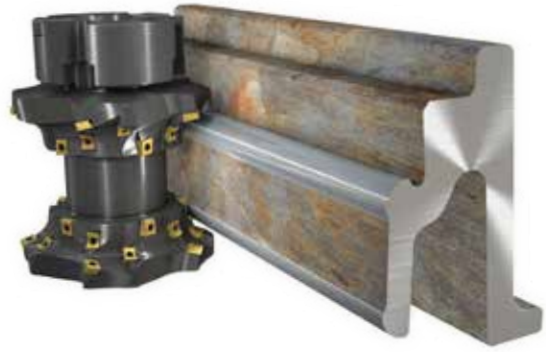
LOGIQ
ISCAR CHESS LINES

**Rotating tools**

Many operations for railway part machining involve rotating tools, especially for milling and drilling functions. In milling, due to the high volume of removed material, conical and profile indexable extended flute cutters are used. The cutters with tangentially clamped inserts feature better possibilities for improving tool strength and ensuring higher tooth density that result in increased productivity. In many cases, milling the railway parts requires long-reach tools with different overhang. Modular shell mill design configuration offers a flexible and economical alternative to large-size extended flute cutters with integral body (integral-type design).



# T490 – A modular solution



**Extended flute shell mills**

The combinations of the base units and extensions ensure a variety of extended flute shell mills with different cutting lengths. The modular extended flute assembly possesses another advantage in improving operations. As the first-row inserts in extended flute cutters, which are located near a cutter face, are involved not only in side milling but also in face milling, they experience harder loading and their wear is more intense compared with the other inserts of the cutter. In integral-type cutters, a sudden breakage of a first-row insert can cause serious damage of the cutter and even render it inoperable. In the modular assembly, each damaged insert can be replaced individually, which enables efficient operation and extended tool life.

ISCAR's new cutters are designed with coolant through to extend tool life and improve chip evacuation in problematic areas such as slotting and deep shouldering. This is especially valuable for tangential clamping as the special profile extended flute cutters ensure a reduction in machining time.

In some cases, the profile in the switcher can be machined in one single pass; in other cases it is necessary to divide the machining into several passes to produce the right profile and diameter with the correct dimensions.

HELITANG
T490 LINE

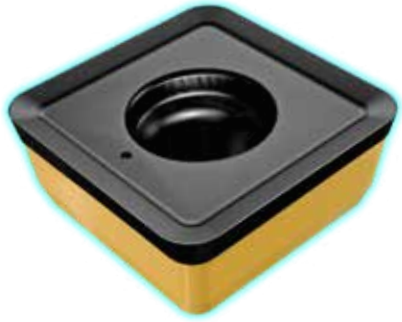
Extra Strong Tangential Insert for Deep Milling

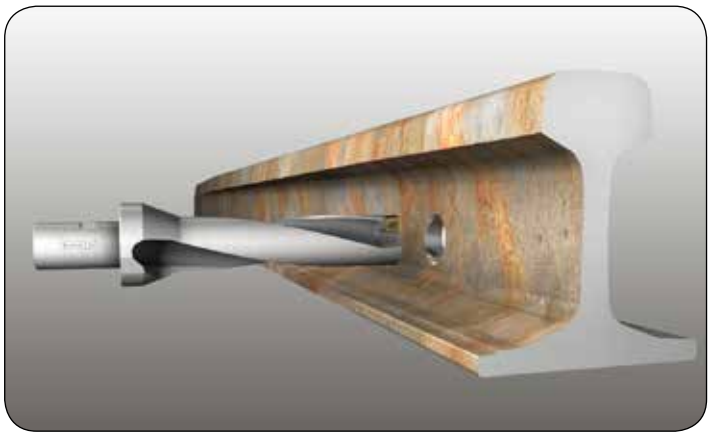
**Face milling**
The newly introduced T890 line represents a range of face mill cutters for rough and semi finish machining that carry tangentially clamped inserts with 8 cutting edges, intended for facing and shouldering operations in the switchers and bogie frames. The inserts feature different cutting geometry, designed for machining various engineering materials.

**FFQ4 for high feed machining**
A new family of high feed mills that carry square single-sided inserts with 4 cutting edges, the FFQ4 is designed to reduce cutting forces when used on low power machines or long overhang applications. The cutters are available in different design configurations: shell mills in 40 to 100 mm diameters, and end mills and replaceable milling heads in smaller diameters. The cutters are intended for roughing operations, such as machining plane surfaces, cavities and pockets, including ramping by line and helix.

MILL4FEED HIGH FEED

Square Insert for High Feed Face Milling





**Drilling**
Old traditional bridge-type machines sometimes require high overhang and the drills often need to operate in conditions of reduced rigidity.

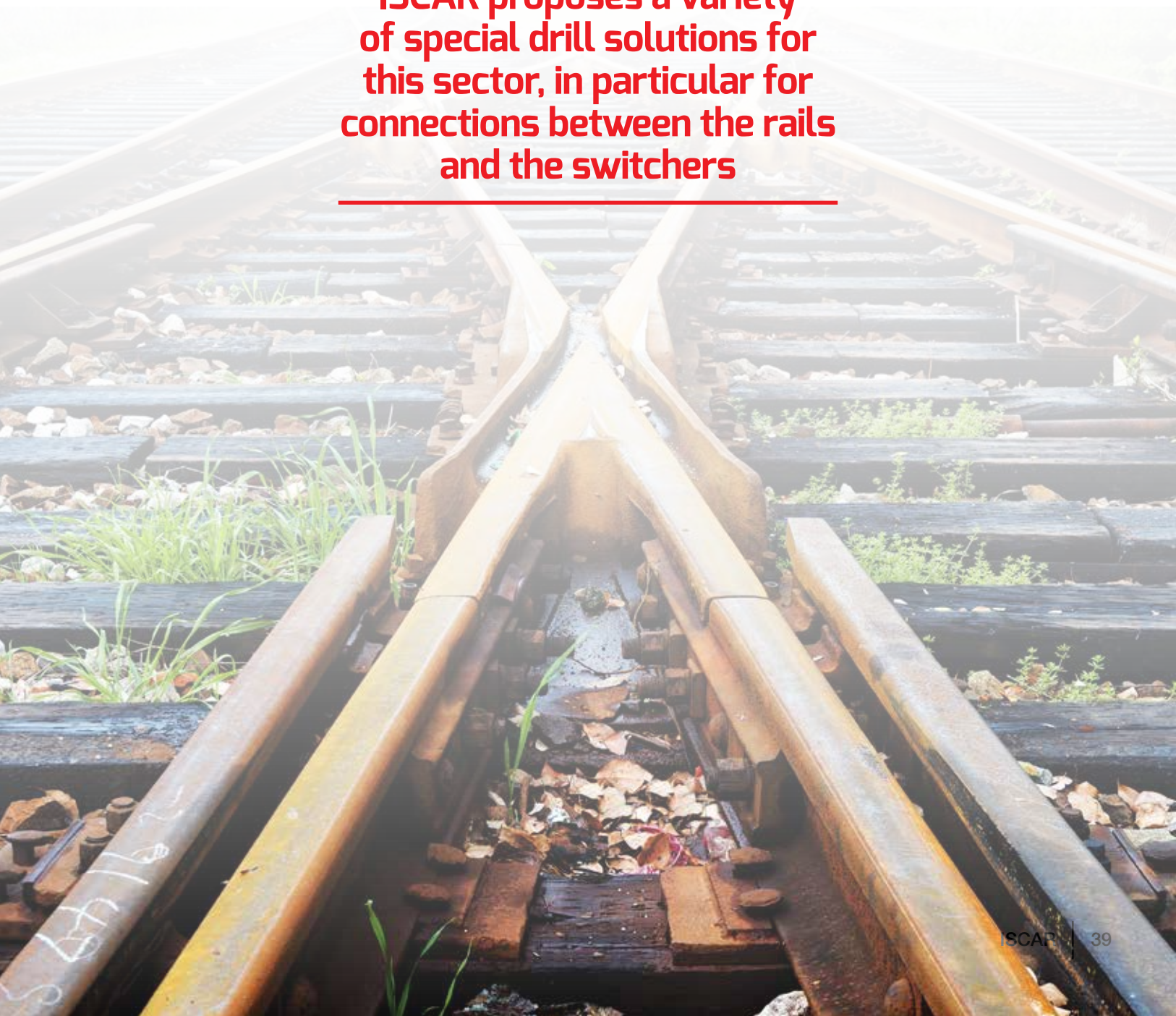
The new **SUMOCHAM** drills with exchangeable drill heads, cylindrical shank and internal coolant holes enable high feed drilling, high accuracy and good surface finish.

Exchangeable ICP-type drill heads are recommended for carbon and alloy steel (ISO P material group), commonly used in producing railway components, and have already received good marks in drilling operations in producing bogie frames.

Combined drills enable users to perform drilling and chamfering operations with the use of the same tool. Manufactured in different diameters, cutting depths and overhangs, the design of the drills facilitates an increase in cutting range conditions and a reduction both in cycle time, as well as in the number of drills involved in the process.

ISCAR proposes a variety of special drill solutions for this sector, in particular for connections between the rails and the switchers, which result in significant reductions in machining costs.
The railway sector's distinctive characteristics and demands impact on cutting tool development in many ways. ISCAR has responded accordingly by designing innovative, productive and reliable solutions intended for heavy-duty applications, that have already been adopted with enthusiasm by manufacturers to improve their processes.

**ISCAR proposes a variety of special drill solutions for this sector, in particular for connections between the rails and the switchers**



# Connecting New Generation Tools to New Generation Machining Centers

**Modern industry demands fast and effective solutions for mass production. The new generation of multi-spindle machining centers responds to this need; they can increase productivity by the simultaneous machining of two to four workpieces. ISCAR has correspondingly developed tooling solutions for this type of machine to ensure precision and quality in minimal setup time.**

Tool builders need to adapt to developments in the aerospace, aviation and medical industries that have necessitated machining high-temperature or exotic materials with maximum efficiency. In particular, the application of coolant with high (or ultra-high) pressure, directly to the working area to increase efficiency and chip flow, requires a suitable tooling solution.

Vertical pick-up turning machines have wide applications for manufacturing of automotive, hydraulic and general industry parts, and their value in maximizing efficiency should not be underestimated.

**Tools for Multi-Spindle Machining Centers**

A multi-spindle machining center saves space at a manufacturing facility and reduces tool inventory by using combined tools for sequential operations and decrease setup time by assembly and adjustment of the same tool for each spindle.

The principal aim for using multi-spindle machines without Z-axis compensation is to facilitate the axial adjustment needed to achieve overlength precision. This ensures part repeatability over all spindles and reduces cutting time, due to a more precise cut pass.

There are several existing methods for this purpose:

- Grinded spacers, commonly applied on face milling cutters to provide a simple technique for length adjustment
- Adjustable wedges on inserts for fine turning of overlapping (sometimes in addition to grinded spacers) commonly used for face milling of the finish operation
- Tools for drilling or boring operations, with exact hole depth, which can be adjusted by cartridges (there is also an option for radial adjustment). For simple solid carbide drills, the tool can be mounted on an adjustable holder.
- Complex tools, incorporating different types of instruments, which can be combinedly adjusted by some (or all) aforementioned methods.

The adjustment of complicated technical systems to meet customer requirements necessitates additional time and human resources for assembly and fine-tuning procedures.

Adjustable cartridges

Combined system adjustment


A leading supplier of cutting tools and related accessories, ISCAR provides completely assembled, adjusted, balanced and well packed tools.

**MQL Applications**

Minimum Quantity Lubrication (MQL) technology is widely applied to multi-spindle machine tools, as it circumvents the problem of liquid leakage from machine and does not require additional equipment for coolant return. MQL helps to maintain the machine's condition during continuous usage, improves chip quality, evacuation and recycling, and represents a "green" technology for a healthier environment.

**Tools with High Pressure Coolant**

Applying high-pressure coolant in grooving and parting operations provides excellent chip breaking results on all materials, reducing or even eliminating built-up edge phenomenon, particularly when machining stainless steel and high temperature alloys. To harness these capabilities, ISCAR designed a wide range of tools for turning, grooving and parting applications with high pressure coolant, with different sizes, adaptations and machine interface connections.

The **MODULAR-GRIP** systems for high pressure coolant were developed to reduce tooling costs and inventories, taking into consideration many years of experience in working with leading machine tool builders. Cooperation with significant players in the machine tool manufacturer market has led to the development of standard lines of dedicated tools for each MTB interface, such as VDI, Dove tail (DT), CAMFIX, and a wide range of specific interfaces. CNC turning machines with disc-type turrets use different interfaces and often require adjustment of the tool's overhang.

ISCAR provided an answer to this need with the Multi Connection (MC) JHP line for turning, parting, grooving and threading tools mounted on holders with a bottom fed coolant system, which allows simple and rigid clamping and is widely used by European, Japanese, Korean, USA, Chinese and Taiwanese MTBs. The multi connection tools enable clamping on quick change tool holder and also directly on the turret with different coolant connections. Tools with a jet high pressure (JHP) coolant outlet also deliver an advantageous performance when conventional pressure is applied.

A complete solution from cutting edge to machine

Tool overhang adjustment for bottom feed holders

**UHP Solutions**

Ultra-high pressure coolant (UHP) tools facilitate effective machining of titanium and heat resistant materials utilized by the aerospace industry, in order to achieve high machining rates while maintaining small chip sizes. ISCAR provides a variety of special UHP solutions for different types of machine interfaces and various applications.

**Tools with CAPTO connections without automatic tool changers (ATC)**

Vertical pick-up turning machine turrets can be equipped with instruments without ATC, which enables tools to be manufactured with as short an overhang as possible. This in turn increases machining process rigidity and stability,  and lowers tool production costs.

ISCAR has developed dedicated CAPTO blanks with no ATC flange or inner thread, specifically for producing these types of instrument.


Example of a tool without automatic tool changers

# ISCAR INDUSTRY 4.0 PRO

**The metal cutting tool industry is becoming increasingly more digitized. Valuable cloud information to support your daily production environment is simply a click away.**

ISCAR introduces 4 PRO, a new online product information and machining recommendation tool. 4 PRO characterizes the enormous impact of Industry 4.0 on smart factory operations, maximizing connectivity to increase productivity and reduce costs. Combining new technologies with manageable applications, 4 PRO provides customized machining recommendations.

4 PRO is now compatible with any operating system, enabling you to view vital process planning data in real time before beginning the machining process, ensuring that the selected tools and inserts deliver machining results to meet your needs.

The **Catalog** option introduces product geometrical information, presented according to the ISO 13399 standard, including the product, pack size, and production order number for traceability at your end.

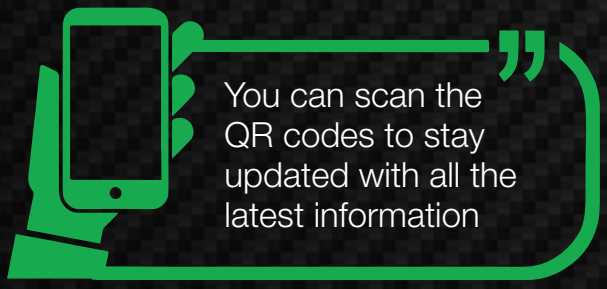
The **Relations** option ties together inserts and tools to match them up. Complete information is provided about every product.

The **ISO PMKNSH** option provides recommended cutting speeds and feeds for machining any type of metal according to the suggested ISCAR grade.

The **More Info** option provides additional product information which may be essential for your work and process planning.

The **Grade Optimizer** option bonds the insert geometry and its coating to the correct type of metal, allowing you to make better choices at the planning stages of the process.

# Become an **INDUSTRY 4.0 Master!**




ISCAR WORLD for ANDROID

GET IT ON Google Play

ISCAR WORLD for IOS

Download on the App Store

E-Catalog

E-CAT ELECTRONIC CATALOG

Member IMC Group

www.iscar.com