



Aerospace Industry

High performance cutting tool solutions
for the **AEROSPACE**
Industry





Tool Communication

First Choice

Good

PRODUCT	DESCRIPTION		APPLICATION				
	TOOL TYPE	PAGE	SUPER ALLOY	TITANIUM	STAINLESS STEEL	ALUMINIUM	CFRP
	FTO-GDS / GDN Carbide drill	4					
	SHR-DRL Carbide Drill	4					
	FTO-GDXL Carbide Drill	6					
	VPH-GDS CPM Drill	6					
	NEXUS-GDS / GDR HSS Drill	8					
	EX-SUS-GDS / GDR HSS Drill	8					
	CAO-GDXL Carbide Drill	9					
	D-GDN Carbide Drill	12					
	E-series PMT-15 Taps	4					
	V-Ti-Series PMT-15 Taps	7					
	CC-SFT Series HSS-EV3 Taps	8					
	AL Series HSS-EV3 Taps	10					
	NEO-Series Carbide End Mill	5, 7					
	Exocarb Aero Carbide Rougher	5					
	UP-PHS Carbide End Mill	9					
	HYP-CR-Hi-WEMS Radius Carbide End Mill	9					
	CA-Series Carbide End Mills	10					
	Exocarb Aero Blizzard Carbide End Mills	11					
	PCD	11					
	HBC (Diamond Coated) Carbide End Mills	13					
Before Regrinding After Regrinding	Tools Refurbishment Service	14					



The world of Aerospace manufacturing is a constantly evolving market, with more and more exotic materials being used in order to give a higher strength to weight ratio.

The challenge for all manufacturers supplying tooling for this market is to provide products that can maintain a long and consistent tool life. This has been the goal of OSG and contained within this brochure are many of our newly designed products for the Aerospace sector.

We have particularly concentrated on tooling for one of the most difficult to machine new composite materials; CFRP (carbon fibre reinforced plastics) which is used in the production of many of the world's new advanced commercial and military aircraft. There are also many new tools for established materials, including Titanium & Nickel Based alloys.

We are confident that the challenges asked of tooling manufactures for this market can confidently be met by our new Aerospace tooling range.

If you would like to talk in more detail regarding any of the products within this brochure, please contact our Sales office and they will arrange a visit from one of our experienced Sales Engineers

**4****Cutting Tools For Super Alloys****10****Cutting Tools For Aluminium Alloys / Castings****6****Cutting Tools For Titanium Alloys****12****Cutting Tools For CFRP***New technology defeats delamination***8****Cutting Tools For Stainless Steels**

Drilling Solutions for Super Alloy's



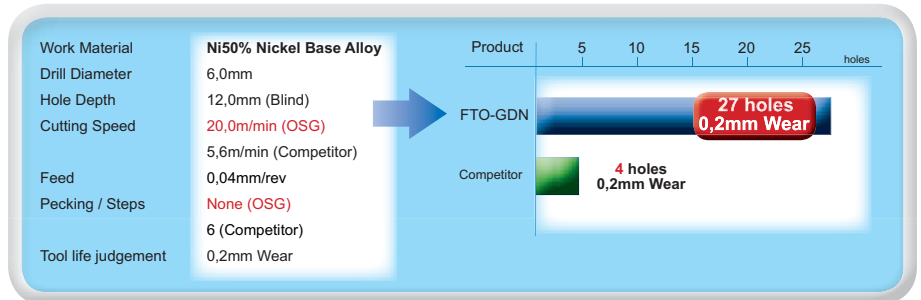
FTO-GDS / GDN Through Coolant Carbide Drill

High performance through coolant carbide drill coated with OSG's FX coating to give superior performance in Super Alloy's.

Technical

Sizes

FTO-GDN (Normal Length)
3,0mm ~ 20,0mm.
FTO-GDS (Stub Length)
2,8mm ~ 10,2mm



NEW



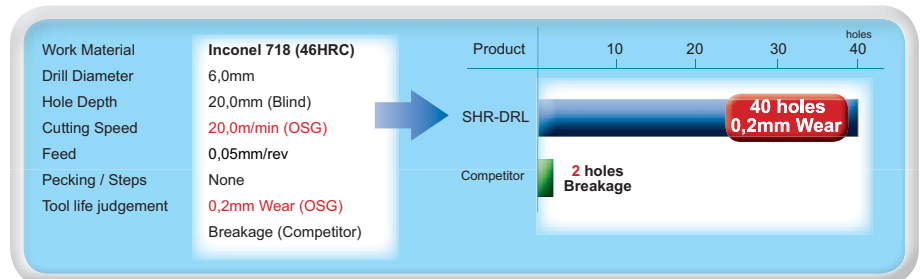
SHR-DRL Special Micro Grain Carbide Drill for Ultimate surface finish

Micro grain class carbide drill for longer tool life, featuring a low helix design for higher rigidity, special thinning for lower thrust force and a smaller chamfer for improved sharpness. Offers greater accuracy than standard drills 0,03mm wear after 20 holes in application below.

Technical

Sizes

Made to order.



Tapping Solutions for Super Alloy's



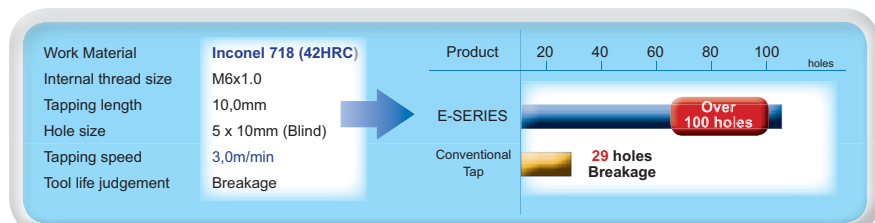
E-Series Taps, E-SFT For Blind Holes and E-POT Taps for Through Holes

Until now, nickel base alloys such as Inconel 718 have proven to be extremely difficult materials to tap. Tool wear has always been a problem, and tool life was very short. Now due to OSG's unique design these materials can be tapped with great success. The E-Series range of taps provide an efficient and productive solution to the tapping nickel based super alloys.

Sizes

Metric M3 ~ M12
UNJF No10 ~ 1/2
UNJC No4 ~ No8
Wire Insert thread series also available.

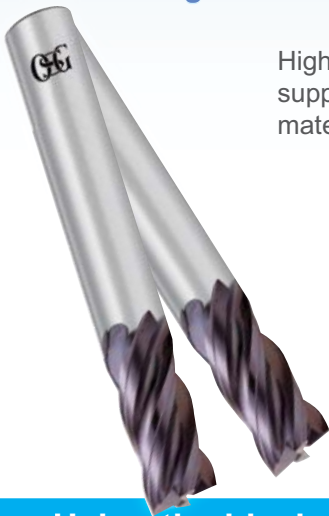
Technical



Milling Solutions for Super Alloy's

NEW

Neo-Series, Variable Lead Carbide End mills



High performance coated carbide end mills with OSG's new variable lead technology, suppresses chattering allowing for outstanding milling performance in difficult to machine materials.

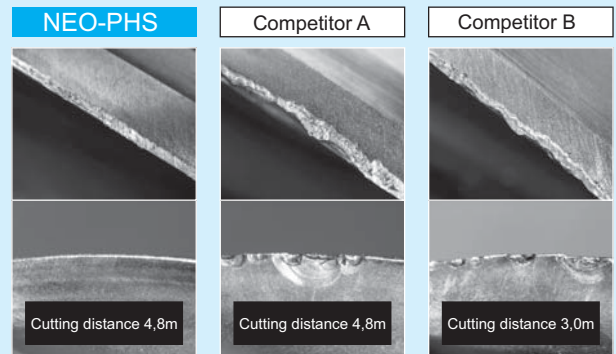
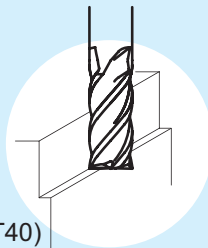
Sizes

NEO-PHS 3,0MM ~ 25,0MM
NEO-CR-PHS 3,0MM ~ 25,0MM. (R0,2 ~ R5)

Technical

Using the ideal cutting edge (positive edge form) for cutting difficult to machine materials, stable machining can be achieved

Tool	NEO-PHS dia. 10mm
Work Material	Inconel 718 (45 HRC)
Milling Method	Side Milling
Milling Speed	1,300 min ⁻¹ (40m/min)
Feed	210 mm/min (0.04mm/t)
Milling Depth	$a_p = 15\text{mm}$ (1,5D) $a_e = 0,5\text{mm}$ (0,05D)
Coolant	Water soluble Fluid (5%)
Machine	Vertical Machining Centre (BT40)



NEW

Exocarb Aero Rougher: TiALN Coated Carbide End mill

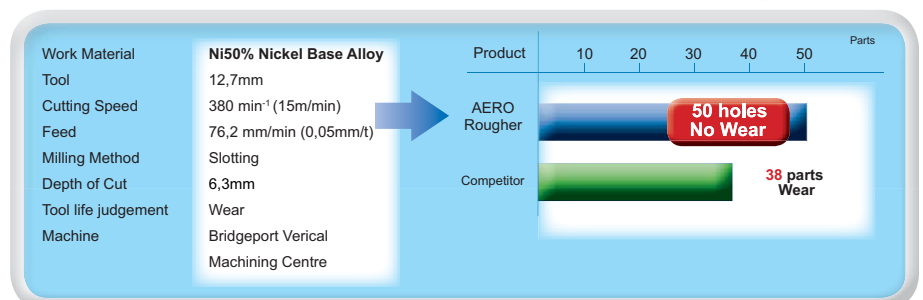


Specially designed for maximum metal removal rates allowing for improved machining times, reduced horsepower requirement due to unique design features. Able to machine interrupted parts

Sizes

Imperial 1/4 ~ 1"

Technical



Drilling Solutions for Titanium

FTO-GDXL Through Coolant Carbide Drill

High performance through coolant carbide drill coated with OSG's FX coating to give superior performance in Titanium Alloy's.

When deep-hole drilling with traditional methods, Cost effectiveness is hard to achieve. OSG has developed the FTO-GDXL , a revolutionary solid carbide coolant-hole drill capable of drilling up to 30 times drill diameter without a peck cycle.

To achieve deep-hole drilling at high speeds and feeds, the FTO-GDXL utilises a micro-grain carbide construction, TiALN coating, and special chip evacuation features. Production times are now measured in seconds rather than minutes.

The FTO-GDXL drill drastically reduces deep-hole drilling production time and costs versus traditional methods in a variety of work materials



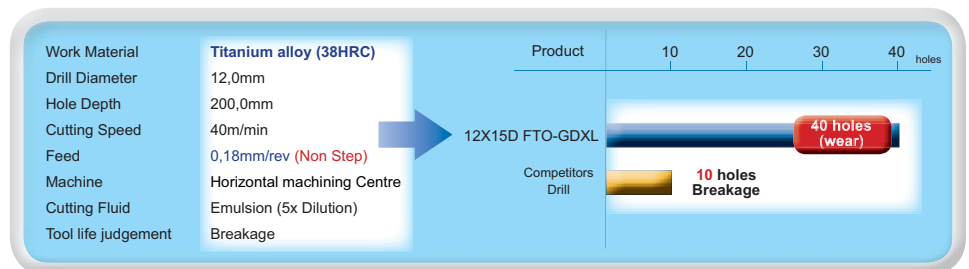
NON-STEP DRILLING

Sizes

- 10XD 2,0mm ~ 12,0mm
- 15XD 3,0mm ~ 10,0mm
- 20XD 4,0mm ~ 10,0mm
- 30XD 5,0mm ~ 8,0mm

Use FTO-GDS for Pilot

Technical

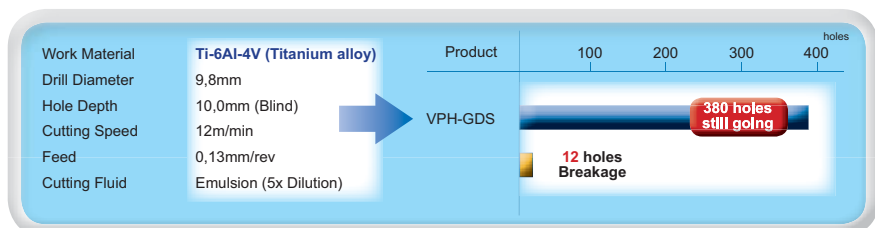


VPH-GDS, Powder Metallurgy Drill For Difficult Materials.

Manufactured from OSG's XPM material and V (TiCN coated)
Special rigid flute design to overcome the high cutting forces produced when drilling difficult materials



Technical



Sizes

- 0,5mm ~ 20,00mm

Tapping Solutions for Titanium

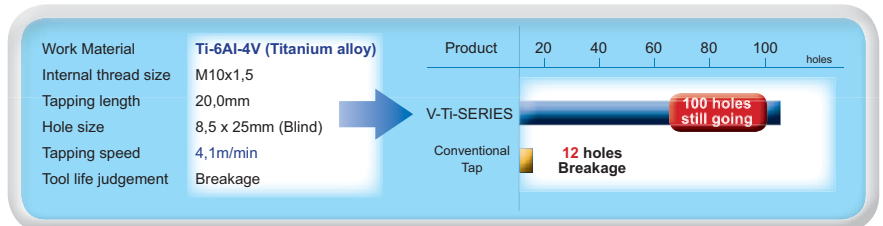


V-Ti-Series Taps, SFT For Blind Holes and POT Taps for Through Holes

Titanium alloys have historically been difficult to cut due to poor heat conductivity, strong alloying tendencies and work hardening characteristics. OSG's V-Ti range is designed to overcome these difficulties and produce high quality and high precision threads. This is achieved by combining the optimum design features of tap material, coating technology, flute and thread geometry to enable swarf to be ejected in a highly efficient operation.

Sizes

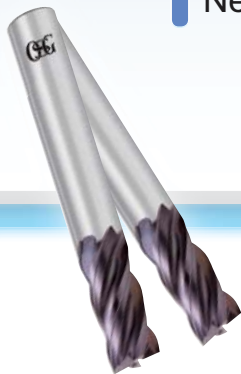
Metric SFT M1,6 ~ M12.
Metric POT M3 ~ M12



Technical

Milling Solutions for Titanium

NEW

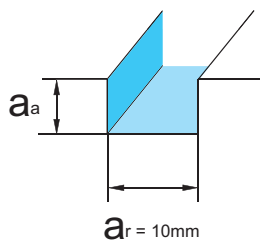


Neo-Series, Variable Lead Carbide End mills

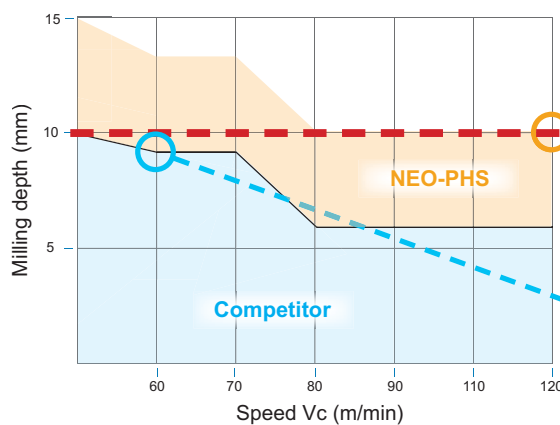
High performance coated carbide end mills with OSG's new variable lead technology, suppresses chattering allowing for outstanding milling performance in difficult to machine materials.

Technical

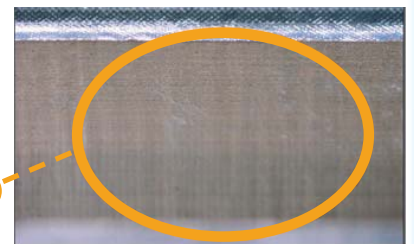
Application Slotting



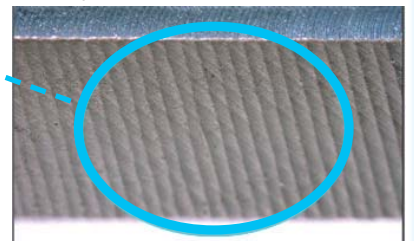
Work Material: Ti-6Al-4V (Titanium alloy)
Tool: 10,0 NEO-PHS
Feed: 0,05mm/t
Cutting Fluid: Emulsion (5x Dilution)
Machine: Vertical M/C (BT40)



NEO-PHS : Smooth Surface Finish



Competitor : Chattered Surface Finish



NEO-PHS provided a 170% increase in productivity at the optimal milling condition 1xD depth of cut and a cutting speed of 120 VC (m/min).

Sizes

NEO-PHS 3,0MM ~ 25,0MM
NEO-CR-PHS 3,0MM ~ 25,0MM. (R0,2 ~ R5)

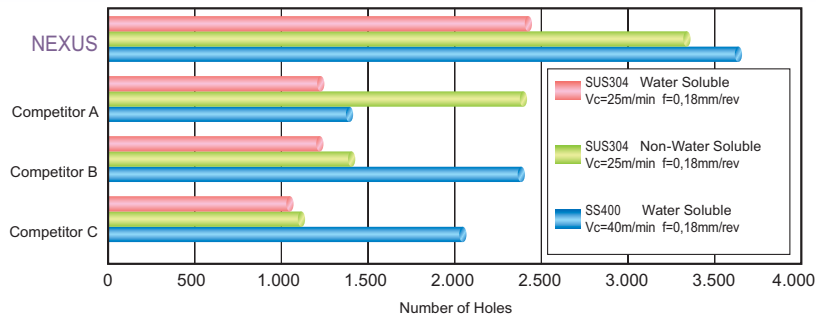
Drilling Solutions for Stainless Steel

NEW

NEXUS-GDR / GDS Next Generation HSS-EV3 Drill Series



HSS drills with OSG's WD1™ coating technology allowing for both high speed and long tool life in Stainless Steel applications



Sizes

NEXUS-GDS
1,0mm ~ 12,0mm
In 0,1mm increments
NEXUS-GDR
2,0mm ~ 12,0mm



EX-SUS-GDR / GDS HSS-EV3 TiN Coated Drills

The unique high helix flute form design reduces work generated heat, and work hardening.

Premium grade vanadium high speed steel, with increased toughness to prevent chipping often associated with machining stainless steel.

Non step drilling 3~4 times diameter is possible.

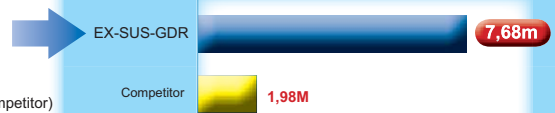
Technical

Sizes

EX-SUS-GDS 0,5mm ~ 6,0mm
In 0,01mm increments
6,1mm ~ 13,0mm In .1mm Increments
13,5mm ~ 20,0mm in 0,5mm Increments
EX-SUS-GDR 0,5mm ~ 6,0mm
In 0,01mm increments
6,1mm ~ 13,0mm In .1mm Increments
13,5mm ~ 20,0mm in 0,5mm Increments

Work Material	SUS304 (Austenitic Stainless)
Drill Diameter	20,0mm
Hole Depth	60,0mm (Through)
Drilling Speed	16,0m/min
Feed	0,4mm/rev
Pecking / Steps	None
Tool life judgement	Wear (OSG) Breakage (Competitor)
Cutting Fluid	Emulsion (5x Dilution)

Product	2,5	5,0	7,5	10 metres
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Tapping Solutions for Stainless Steel

NEW

CC-Series high performance taps with chip control : For blind holes

Suitable for Stainless Steels, 17-4 PH, Steels, Aluminium & Copper. Developed for CNC machines equipped for rigid tapping. Suitable for tapping applications up to three times diameter. For pilot hole use NEXUS-GDS drills.

Technical

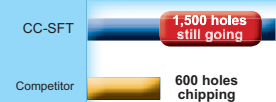


Sizes

Metric M2 ~ M24.
UNJC No8 ~ 1" UNJF No10 ~ 1/2"
G Series (BSP) 1/8 ~ 1/2

Work Material	SUS304
Internal thread size	M8x1,25
Tapping length	16mm (Blind)
Hole size	6,8
Tapping speed	8m/min
Coolant	Water soluble
Machine	Vertical Machining centre

Product	1,000	2,000 holes
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Milling Solutions for Stainless Steel

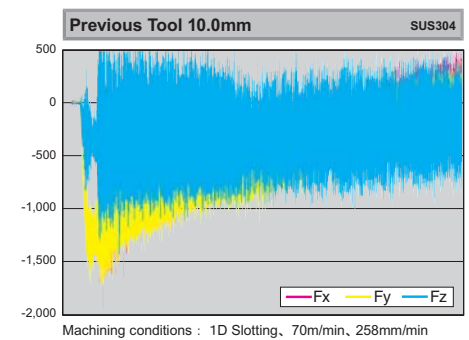
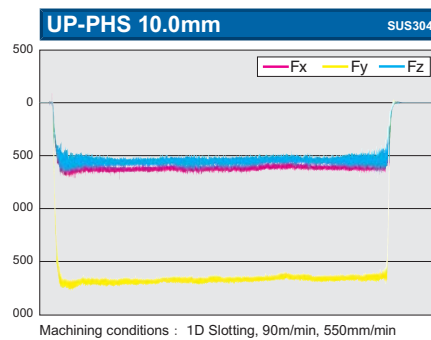
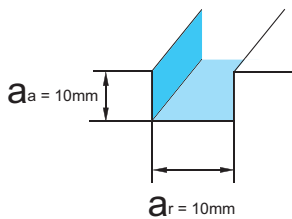
UP-PHS: Vibration Resistant Multi Purpose Carbide End mills

Carbide end mill featuring special geometry designed for cutting performance and vibration resistance, OSG coating technology for enhanced chip flow.

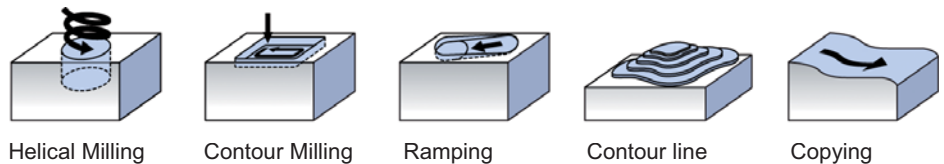


Technical

Work Material	SUS304	Product	2 4 6 8 10 12 14 16 18 Metres
Tool	10,0mm UP-PHS	UP-PHS	No Chattering 15,75m
Projection length	30mm	Competitor A	Chattering occurred 2,45m
Milling Speed	90m/min (2.685min ⁻¹)	Competitor B	Chattering occurred 3,15m
Feed	550mm/min (0,048mm/t)	Competitor C	Chattering occurred 1,05m
Milling Method	Slotting		
Milling Depth	$a_a = 10\text{mm}$ $a_r = 10\text{mm}$		
Coolant	Water soluble		
Machine	Verical machining centre (BT40)		
Tool Life Judgement	Chattering		



Sizes
3,0MM ~ 12,0M



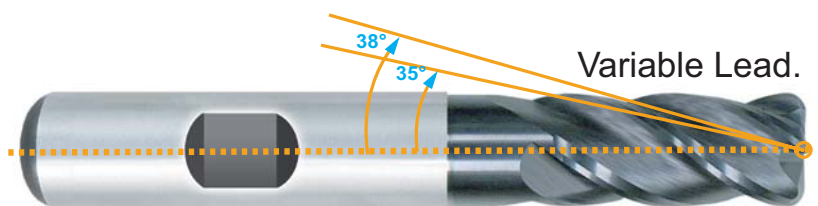
NEW

HYP-CR-HI-WEMS: Roughing and Finishing Carbide Radius End Mill.

Carbide end mill incorporating new variable Helix flute design for better balance, resulting in a superb surface finish. TIALN multi layered coating for increased tool life.



Variable Pitch.



Variable Lead.

Sizes
HYP-CR-HI-WEMS 3,0mm ~ 20,0mm

Drilling Solutions for Aluminium

CAO-GDXL Through Coolant Extra Long Carbide Drill For Aluminium

Capable of non step drilling up to **30X Diameter**

Technical



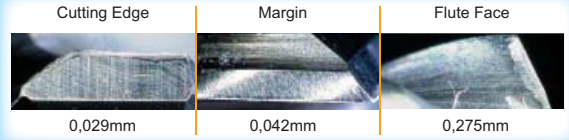
Sizes

15XD : 3,0mm ~ 10,0mm
20XD : 4,0mm ~ 10,0mm
30XD : 5,0mm ~ 8,0mm

Use FTO-GDS for pilot.

Work Material	Aluminium Alloy
Drill Diameter	3,0mm
Hole Depth	66,8mm (23D) (Blind)
Drilling Speed	94,2m/min
Feed	0,1mm/rev
Pecking / Steps	None
Cutting Fluid	Water Soluble
Machine	Vertical machining centre

Wear Amount (Drill)



After drilling **4.080 holes (277,4m)**, the wear amount on the drill is low. And inspite of drilling cross holes, no chipping was visible.

Tapping Solutions For Aluminium

AL-Series Taps, SFT For Blind Holes and POT Taps for Through Holes

AL-Series machine taps are manufactured from HSS-EV3 grade material to improve wear resistance. They also incorporate our special "wide chip room" flute technology to assist swarf clearance.

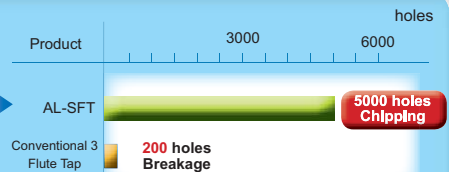
Technical



Sizes

Metric SFT M1,6 ~ M20
Metric POT M2 ~ M10

Work Material	AC4B-T6 (Aluminium Casting)
Internal thread size	M6x1,0
Tapping length	20,0mm (Blind)
Hole size	5 x 24mm (Blind)
Tapping speed	14,6m/min (775min ⁻¹)
Cutting Fluid	Soluble Fluid (10 Times)
Machine	Vertical Multi Spindle Machine
Tool life judgement	OSG Chipping



Milling Solutions For Aluminium

CA-Series Carbide End Mills, ETS (3 Flute) CR-ETS (3 Flute Corner Radius)

CA Series End Mills offer excellent surface finish and accuracy whilst maintaining a highly efficient milling time. Manufactured from OSG's micro grain carbide. And incorporating a three flute design with special geometry to minimize vibration.

Technical

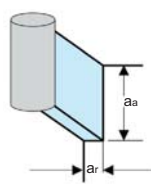


Sizes

CA-ETS: 3,0mm ~ 20,0mm
CA-CR-ETS: 3,0mm ~ 16,0mm
(Various radiuses)

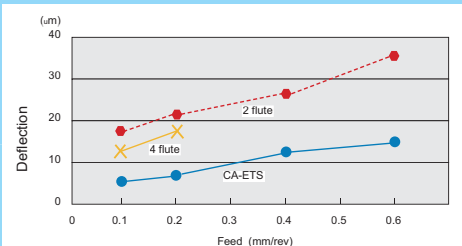
We compared the deflection on the work piece using standard 2 and 4 flute carbide cutters against OSG's CA-ETS (3 flute). Using CA-ETS no vibration occurred up to a feeding speed of 0,6mm/rev. There was also significantly less deflection then when using 2 and 4 flute cutters, thus machining efficiency and precision are maximised.

Tool	CA-ETS Ø 10
Work material	A7075
Cutting speed	628 m/min (20.000 min ⁻¹)
Feed	2.000 ~ 12.000mm/min
Milling method	Side milling (down cut)
Depth of cut	a _a = 15mm a _r = 1mm
Coolant	Water soluble
Machine	Horizontal machining centre (BT40)



Deflection comparison using :

● CA-ETS (3 flute) × 4 flute cutter ● 2 flute cutter



Vibration occurred when using 4 flute exceeding 0,1mm/rev

Milling Solutions For Aluminium.

NEW**Exocarb Aero Blizzard: Carbide end mill series for Aluminium**

To compliment our range of metric tooling we are pleased to offer you our latest imperial carbide end mill series designed exclusively for the aerospace industry



Sizes
1/8 ~1"

PCD (Polycrystalline Diamond) Cutting Tools For Aluminium

NEW**PCD Special Tools (Made to order)**

Polycrystalline Diamond tooling ideal for Aluminium applications.
3-4 week lead time with PCD tip and solid carbide body.
Special form, Multiple flutes 2,3,4,6 & 8, Step Tools, Spot facing cutters and so on..



- Harder than tungsten carbide
- Low coefficient of friction
- Minimal chip welding
- Excellent heat transfer properties

Sizes
Made to order.



Cutter diameter tolerances
 $\pm .001\text{mm}$

Drilling Solutions for CFRP (Carbon Fibre Reinforced Plastic)

NEW

CFRP Diamond coated carbide drill



The drilling of composite materials is becoming more common and there are various manufacturers designing and producing drills for these applications.

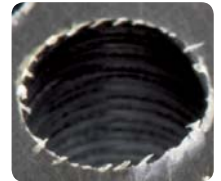
However only OSG can offer exceptional drill performance and tool life.

Our drill design benefits from a high helix angle and high rake angle to produce a lower cutting force, together with our special drill point technology and patented smooth diamond coating. Allowing us to produce what we believe to be the best drilling solution for CFRP.

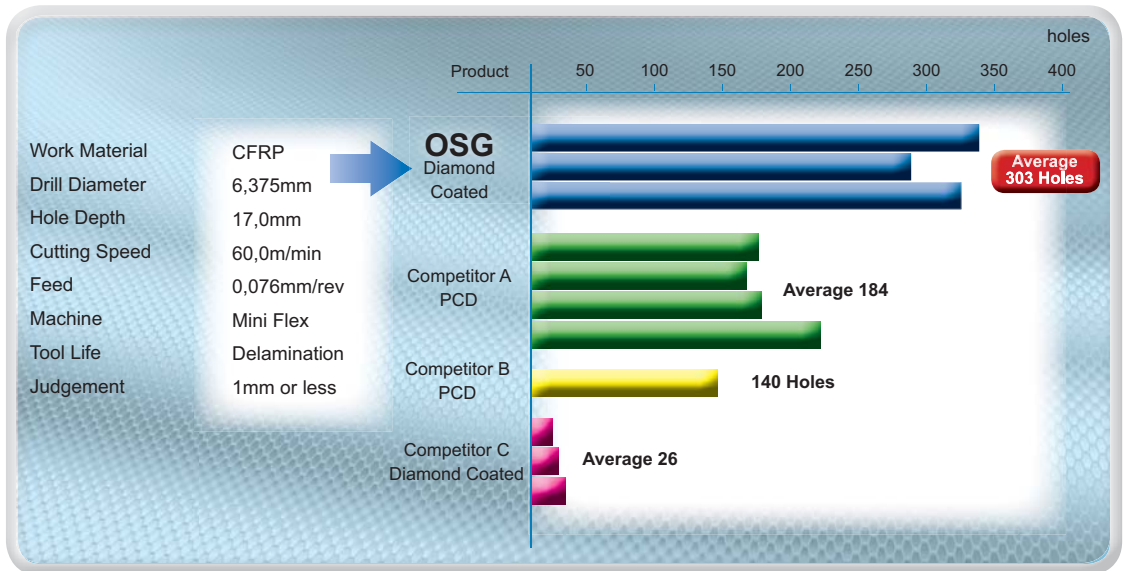
OSG



Competitor



Technical



Sizes

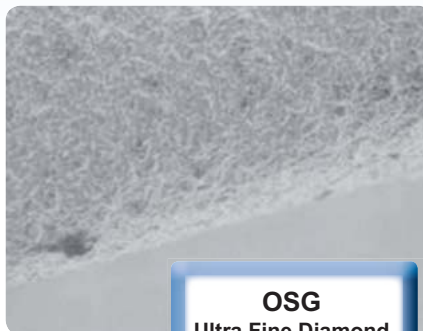
Made to order.

Technical

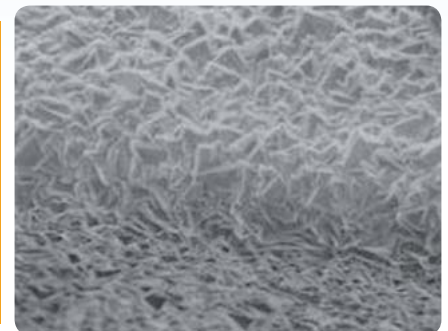
NEW

Ultra Fine Diamond Coating.

OSG's new patented diamond coating is made from ultra fine diamond crystals in an innovative new process. This coating can easily be distinguished from other diamond coatings by its shiny finish, It will give a better surface finish and performance and is only available from OSG.



OSG
Ultra Fine Diamond



Conventional Diamond Coating

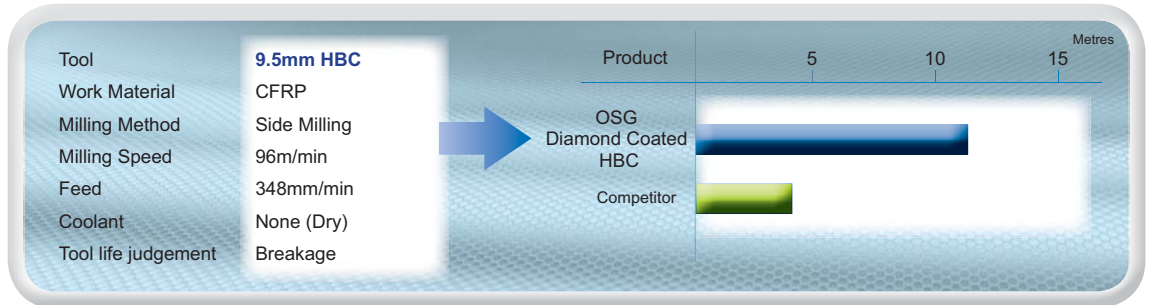
Milling Solutions for CFRP (Carbon Fibre Reinforced plastic)

NEW

HBC Diamond coated carbide end mill.

Our new end mill series for CFRP incorporates a herringbone flute design which diverts cutting forces inwards eliminating delamination. In addition our patented diamond coating with it's finer grain structure allows for a sharper cutting edge which in turn helps prolong tool life and produce a superb surface finish.

Technical

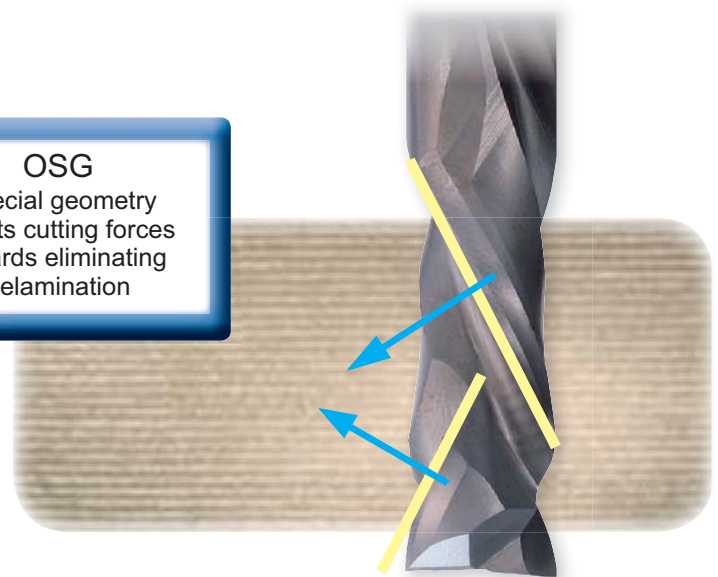


Sizes

Made to order.

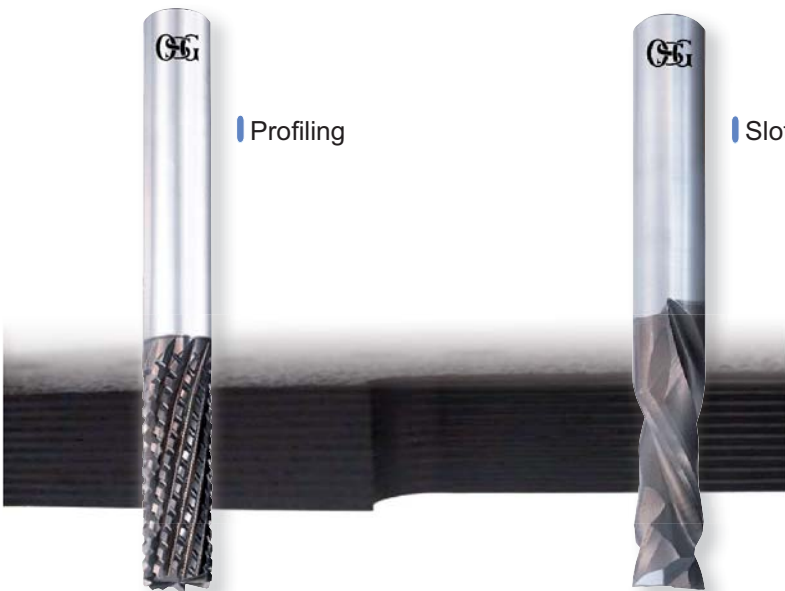


OSG
Special geometry diverts cutting forces inwards eliminating delamination



Profiling

Slotting & Profiling



Tool refurbishment service

New tool quality at a regrind price!

- ▶ Performance tools ground to original specification
- ▶ State of the art regrinding facility
- ▶ Tools inspected to OSG standards
- ▶ Deliveries as short as 5 days



Our new catalog is available now !

The image shows the cover of an OSG Europe catalog. The background is a vibrant blue with a faint map of Europe. Three large white circles are arranged in a triangular pattern, each containing a stylized white line-art icon of a different type of cutting tool: a drill bit, a tap, and a reamer. Below these icons, a collection of various metal cutting tools is displayed, including several drill bits of different sizes and colors (silver, orange, black), and two tapping tools. The tools are set against a white background that features technical drawings of a drill bit and a tap, with dimension lines and labels like L_1 , L , and L_k . The text 'TAPPING - DRILLING - MILLING' is written in a bold, sans-serif font above the 'OSG EUROPE' logo. The OSG logo, a stylized 'OSG' inside a blue gear-like shape, is positioned in the bottom right corner. In the bottom left corner, the text 'TOOL COMMUNICATION OSG CORPORATION' is visible. In the bottom center, there is a small blue square logo with the text 'TOKO-TON SPIRIT' and the website address 'www.osgeurope.com' below it.

TAPPING - DRILLING - MILLING
OSG EUROPE

TOOL COMMUNICATION
OSG CORPORATION

TOKO-TON SPIRIT
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TOOL COMMUNICATION
OSG EUROPE

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