BRITISH MADE. WORLD CLASS.

F1/Motorsport range brochure

Solid carbide tooling, modular tooling and drills

On track
to improve
your machining
performance

INFINITE POSSIBILITIES®

QUICKGRIND carbide tooling

QUICKGRIND
carbide tooling

Machining experts

for F1/motorsport components

We work with Production Engineers, Mechanical Engineers, Programmers, Machine Shop Engineers, Tooling Engineers and Buyers to help them achieve the very high demands placed on them to produce the parts the design and race teams require...

• Drivetrain • Suspension • Steering • Chassis • Body • Wheels/wheel nuts
• Gearbox • Brakes • Instrumentation • Fuel components • Wind tunnel parts

On Time Deliveries (OTD)

OTD is a matrix to record and monitor supplier performance and a crucial part of any company's remit, be they OEM or subcontractors.

Our highly motivated and experienced team works at high speed to deliver the right tools on time, every time.

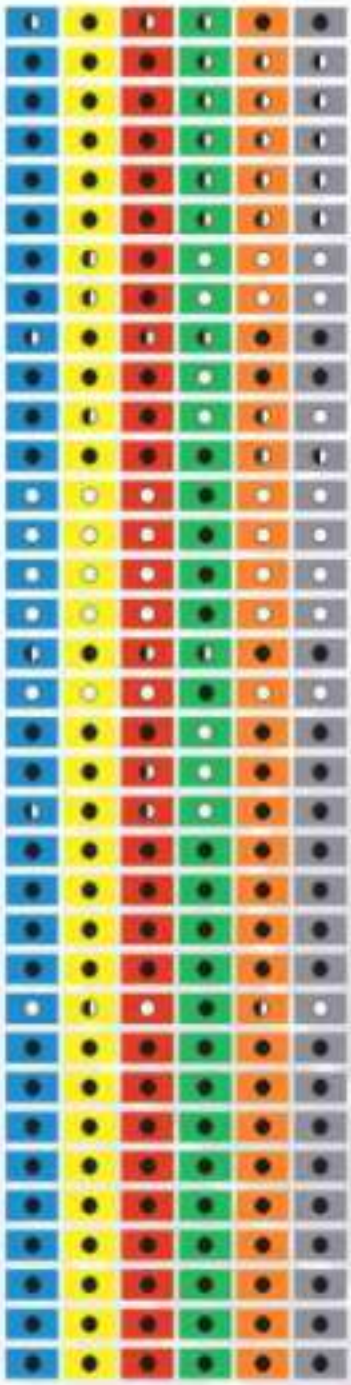
Specials are tailored to suit your individual and unique applications and are turned around in the quickest time of any leading manufacturer.

With Quickgrind you do not have to hold up production for a crucial tool to machine a crucial part.

Quality assured

We employ the latest measuring, metrology and calibration hardware and software to ensure accuracy is within fractions of a micron.

Contents



● Primary ◐ Secondary ○ Unsuitable

Icons key

- Customisable – Infinite Possibilities²
- S — Standard – available ex-stock
- Mod X² compatible – modular heads and shanks
- Remanufacture compatible – regrind, recoat, reuse
- Centre cutting
- Helix angle
- End angle
- Coating type
- Variable index
- Variable helix
- 24 — Number of teeth
- Ball nose
- Coated ball nose
- Coated chamfer
- Coated corner radius
- Chip breaker
- Step down
- Orbit 270°
- Through-coolant
- Chamfer milling
- Slot milling
- Side finishing
- Side roughing
- Profile milling
- Ramping
- Trochoidal milling
- Plunge milling
- Pocket milling
- Helical milling
- 3D milling

Cutting edge **performance**

Quickgrind has been at the forefront of solid carbide tool design and manufacture for more than fifty years. Always at the cutting edge of engineering, we are constantly setting new standards to deliver the optimum tooling for your production.

Motorsport is a fiercely competitive global industry. Formula 1 is a prime example, where the UK plays a major manufacturing role, producing most of the cars and their components.

In all forms of motorsport, from F1 to rally and endurance racing, the goal is to find more efficient ways to make the numerous parts of a race car. Design teams strive to create lighter yet stronger components, often resorting to innovative manufacturing techniques. They also experiment with materials to enhance performance since even a slight reduction in weight or improved aerodynamics can impact race results.

We share that passion and will collaborate with teams to meet the high demands of race car part production, always focussing on quality, innovation and speed (we maintain the quickest turnarounds of any major solid carbide tool manufacturer).

In this brochure you will find a selection of standard tools which are available ex-stock, all designed to meet your needs for a wide range of day-to-day and specialist applications. Look for the 'S' icon to identify the tools in this part of the range...

S **Our standard tools are available ex-stock**

For non-standard tooling there is our Infinite Possibilities² programme. See the next couple of pages to find out more about the future of tool purchasing today...

Look out for this icon to see which of our tools are Infinite Possibilities² compatible

Of course, our standard tools can also be tailored to suit your particular requirements, so if you don't see what you need please ask – we will be able to make it for you.

We even have our Mod X² range of flexible, modular tooling with a choice of interchangeable shanks and heads. Wherever you see this symbol, that tool is available in modular design...

This icon tells you which of our tools are Mod X² compatible

Call **+44 (0) 1684 294090**
or visit **quickgrind.com** to find out more.

INFINITE POSSIBILITIES.®

What if you could have the optimum tool, with the marginal cost increase more than covered by improved production throughput and efficiency? With Quickgrind, you can. Welcome to a world of Infinite Possibilities.®

Our mission is to provide you with solution-based tooling, to give you the right tool, for the right job, at the right price.

Our aluminium cutters can be designed specifically for your application and are available in virtually any size, diameter, radius, neck relief, coating or reach. Through-coolant and other options are also available.

Contact our team today to discuss your applications, aims and requirements.

There are no limits, only Infinite Possibilities®

Call +44 (0) 1684 294090
or visit quickgrind.com

Ordering is as easy as **one, two, three**

1. Choose your shank spec

- Length • Diameter • Tolerance
- DIN or other shank standards

2. Choose your neck spec

- Length • Diameter • Relief

3. Choose your head spec

- Length • Diameter
- Tolerance • Number of flutes
- Helix angle • Anti-vibration
- Radius • Chamfer
- Radial/axial through-coolant
- Ball nose • Coating
- Chip breakers

Just tell us what you need for your job and we will make it for you. Even specials can be designed, proved and delivered in days, at a cost you could recoup on your first job.

That's Infinite Possibilities.®

Because one size doesn't always fit all

Ask engineers what the name Quickgrind means to them and they will invariably say 'bespoke tooling'. And whilst we do have a standard tooling range – some 400+ go-to cutters – our non-standard service is still central to what we do.

To help you identify which of our tools are suitable for the Infinite Possibilities² process simply look for the infinity icon in the list of tooling features. It looks like this...

Look out for this icon to see which of our tools is Infinite Possibilities² compatible

Shown here are examples of just some of the bespoke tools we have designed and made for our F1/motorsport clients.

Why not ask us what we can do for you?

Quality and inspection

Our Quality Management System defines the strategic organisational objectives, policies and procedures associated with all quality-related activities.

We have established, documented, implemented and maintain a Quality Management System that is designed to comply with the requirements of ISO 9001:2015. Quickgrind is committed to both satisfying all applicable requirements and to continually improving their effectiveness.

Our inspection processes form a key part of the Quality Management System with all tools, both new and remanufactured, undergoing stringent pre- and post-production calibration and measurement checks using the very latest equipment and technology, including Bruker Alicona optical metrology machines and Walter Helicheck measuring machines.

MIRAGE
High Performance End Mills

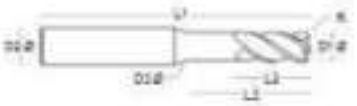
A cut above
the rest

Tool shown 195615

Designed for multiple applications in a wide range of materials especially stainless steel, titanium and super alloys, our Mirage 4 flute end mill provides unrivalled high performance.

Suitable for trochoidal milling, Mirage allows for full flute engagement with step overs (ae) of anything from ≤ 5% to ≥15% in super alloys/stainless steel depending on the CAM software and machine parameters.

Mirage is also available in 5 flutes with and without chip breakers/splitters and is a firm favourite with many F1 and motorsport companies.



Tool shown 195609

Tool shown 195614

Mirage 4 flute variable end mill for super alloys, titanium and stainless steel

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
3.00	6.00	2.80	58.00	10.00	20.00	-	4	195605
3.00	6.00	2.80	58.00	10.00	20.00	0.25	4	195606
4.00	6.00	3.80	58.00	11.00	20.00	-	4	195608
4.00	6.00	3.80	58.00	11.00	20.00	0.25	4	195609
5.00	6.00	4.80	58.00	14.00	22.00	-	4	195611
5.00	6.00	4.80	58.00	14.00	22.00	0.25	4	195612
6.00	6.00	-	58.00	18.00	-	-	4	195614
6.00	6.00	-	58.00	18.00	-	0.25	4	195615
6.00	6.00	-	58.00	18.00	-	1.00	4	195618
8.00	8.00	-	64.00	18.00	-	-	4	195621
8.00	8.00	-	64.00	18.00	-	0.50	4	195622
8.00	8.00	-	64.00	18.00	-	1.00	4	195624
10.00	10.00	-	73.00	22.00	-	-	4	195628
10.00	10.00	-	73.00	22.00	-	0.50	4	195629
10.00	10.00	-	73.00	22.00	-	1.00	4	195631
12.00	12.00	-	84.00	26.00	-	-	4	195635
12.00	12.00	-	84.00	26.00	-	0.50	4	195636
12.00	12.00	-	84.00	26.00	-	1.00	4	195638
12.00	12.00	-	84.00	26.00	-	2.00	4	195640
12.00	12.00	-	84.00	26.00	-	3.00	4	195641
16.00	16.00	-	93.00	32.00	-	-	4	195644
16.00	16.00	-	93.00	32.00	-	0.50	4	195645
16.00	16.00	-	93.00	32.00	-	1.00	4	195647
16.00	16.00	-	93.00	32.00	-	1.50	4	195648
16.00	16.00	-	93.00	32.00	-	2.00	4	195649
16.00	16.00	-	93.00	32.00	-	3.00	4	195650
20.00	20.00	-	105.00	38.00	-	-	4	195652
20.00	20.00	-	105.00	38.00	-	1.00	4	195655

See pages 71 and 72 for cutting data

Tool shown 195652

Chip breakers
for high MRR

Ideal for trochoidal milling strategies (also known as dynamic milling, peeling cut and chip thinning) where a smaller chip is required, Quickgrind's chip breaker form can be produced on any of our tooling ranges, featured here on the Mirage.

Mirage chip breakers are ideally suited for machining stainless steels, duplex steels, titanium and other super alloys where a high MRR is required.

Trochoidal milling allows for full flute engagement with step overs (ae) of anything from 5% to 15% in super alloys/stainless steel. This strategy will produce long, thin swarf which can cause issues. In this case we recommend having chip breakers which will provide a more secure cutting action, especially helpful when you want to reduce your cycle time by machining to full depth in one pass rather than two or three.

This in turn will require a longer than standard flute length, and with our Infinite Possibilities® programme we can provide you with exactly the cutter you need – 4, 5, 6 flutes or more, with any radii or edge preparation you need, together with any length of flute, reach or overall length. For example you can have a 12mm diameter tool with 36.00mm or 40.00mm flute length rather than the usual 26.00mm.

Applications

- Roughing and finishing
- Slotting
- Profiling
- HSM strategic milling
- HSC strategic milling
- Trochoidal milling

Benefits

- Higher feeds and speeds
- Higher wear resistance
- Vibration suppression
- Increased material removal rates
- Better swarf/chip management

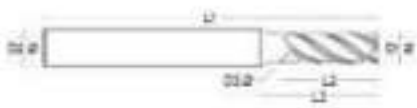
QVari
High Performance End Mills

Two tools
in one

Tool shown 342100

QVari is high performance 4 flute carbide end mill with variable helix and index design, suitable for both roughing and finishing, where applicable, with one tool.

The XRed coating is designed for a wide range of materials including steels, stainless steels, titanium and exotic alloys. QVari can be used in both conventional and trochoidal machining strategies.



QVari 4 flute variable end mill for stainless

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Chamfer x 45°	Teeth Z	Stock code
3.00	6.00	2.90	58.00	8.00	14.00	0.05	4	342030
4.00	6.00	3.90	58.00	11.00	16.00	0.05	4	342040
5.00	6.00	4.90	58.00	13.00	18.00	0.05	4	342050
6.00	6.00	-	58.00	15.00	-	0.08	4	342060
8.00	8.00	-	64.00	22.00	-	0.10	4	342080
10.00	10.00	-	73.00	25.00	-	0.15	4	342100
12.00	12.00	-	84.00	28.00	-	0.15	4	342120
16.00	16.00	-	93.00	35.00	-	0.20	4	342160
20.00	20.00	-	105.00	40.00	-	0.20	4	342200

See pages 71 and 72 for cutting data

Tool shown 342040

QVari-CR
High Performance End Mills

Conventional
and trochoidal milling

Tool shown 670209

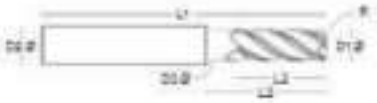
The QVari-CR is a high performance 4 flute carbide end mill with corner radius, variable helix and index design, making it suitable for both roughing and finishing, where applicable, with one tool.

The XRed coating enhances tool life and makes this tool suitable for steels, stainless steels and exotic alloys. QVari-CR can be used in both conventional and trochoidal machining strategies, while the variable corner radius sizes make it very popular within the F1 industry and any applications when there is a corner radius requirement.

- Latest XRed PVD coating developed specifically for hard materials at high speeds
- Suitable for remanufacture and recoating
- HV hardness 3000, 2-4µ thickness, <0.4 coefficient of friction PVD TiSiN and oxidation temperatures of 1100°C

Variable corner radius

Tool shown 670041



QVari-CR 4 flute variable end mill with radii for stainless and HRSA

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Tooth Z	Stock code
3.00	6.00	2.90	58.00	8.00	14.00	0.50	4	670030
3.00	6.00	2.90	58.00	8.00	14.00	1.00	4	670031
4.00	6.00	3.90	58.00	11.00	16.00	0.50	4	670040
4.00	6.00	3.90	58.00	11.00	16.00	1.00	4	670041
5.00	6.00	4.90	58.00	13.00	18.00	0.50	4	670050
5.00	6.00	4.90	58.00	13.00	18.00	1.00	4	670051
6.00	6.00	-	58.00	15.00	-	0.50	4	670060
6.00	6.00	-	58.00	15.00	-	0.80	4	670061
6.00	6.00	-	58.00	15.00	-	1.00	4	670062
6.00	6.00	-	58.00	15.00	-	1.20	4	670063
6.00	6.00	-	58.00	15.00	-	1.50	4	670064
6.00	6.00	-	58.00	15.00	-	2.00	4	670065
8.00	8.00	-	64.00	22.00	-	0.50	4	670080
8.00	8.00	-	64.00	22.00	-	0.80	4	670081
8.00	8.00	-	64.00	22.00	-	1.00	4	670082

QVari-CR 4 flute variable end mill for stainless and HRSA

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
8.00	8.00	-	64.00	22.00	-	1.20	4	670083
8.00	8.00	-	64.00	22.00	-	1.50	4	670084
8.00	8.00	-	64.00	22.00	-	2.00	4	670085
8.00	8.00	-	64.00	22.00	-	2.50	4	670086
8.00	8.00	-	64.00	22.00	-	3.00	4	670087
10.00	10.00	-	73.00	25.00	-	0.50	4	670100
10.00	10.00	-	73.00	25.00	-	0.80	4	670101
10.00	10.00	-	73.00	25.00	-	1.00	4	670102
10.00	10.00	-	73.00	25.00	-	1.20	4	670103
10.00	10.00	-	73.00	25.00	-	1.50	4	670104
10.00	10.00	-	73.00	25.00	-	2.00	4	670105
10.00	10.00	-	73.00	25.00	-	2.50	4	670106
10.00	10.00	-	73.00	25.00	-	3.00	4	670107
12.00	12.00	-	84.00	28.00	-	0.50	4	670120
12.00	12.00	-	84.00	28.00	-	0.80	4	670121
12.00	12.00	-	84.00	28.00	-	1.00	4	670122
12.00	12.00	-	84.00	28.00	-	1.20	4	670123
12.00	12.00	-	84.00	28.00	-	1.50	4	670124
12.00	12.00	-	84.00	28.00	-	2.00	4	670125
12.00	12.00	-	84.00	28.00	-	2.50	4	670126
12.00	12.00	-	84.00	28.00	-	3.00	4	670127
16.00	16.00	-	93.00	35.00	-	0.50	4	670160
16.00	16.00	-	93.00	35.00	-	0.80	4	670161
16.00	16.00	-	93.00	35.00	-	1.00	4	670162
16.00	16.00	-	93.00	35.00	-	1.20	4	670163
16.00	16.00	-	93.00	35.00	-	1.50	4	670164
16.00	16.00	-	93.00	35.00	-	2.00	4	670165
16.00	16.00	-	93.00	35.00	-	2.50	4	670166
16.00	16.00	-	93.00	35.00	-	3.00	4	670167
20.00	20.00	-	105.00	40.00	-	0.50	4	670200
20.00	20.00	-	105.00	40.00	-	0.80	4	670201
20.00	20.00	-	105.00	40.00	-	1.00	4	670202
20.00	20.00	-	105.00	40.00	-	1.20	4	670203
20.00	20.00		105.00	40.00	-	1.50	4	670204
20.00	20.00	-	105.00	40.00	-	2.00	4	670205
20.00	20.00	-	105.00	40.00	-	2.50	4	670206
20.00	20.00	-	105.00	40.00	-	3.00	4	670207
20.00	20.00	-	105.00	40.00	-	4.00	4	670208
20.00	20.00	-	105.00	40.00	-	5.00	4	670209

See pages 71 and 72 for cutting data

QVari LR

High Performance End Mills

Tool shown 272200

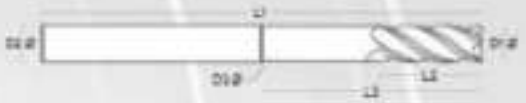
Variable helix and index

with extended reach

QVari-LR (Long Reach) is a high performance 4 flute long reach end mill. Its variable helix and index make this tool suitable for both roughing and finishing on long reach applications.

The XRed coating enhances tool life and makes this tool suitable for steels, stainless steels and exotic alloys. The variable helix geometry ensures stability is maintained when applying this tool in long reach machining applications. QVari-LR can be applied in conventional and trochoidal machining strategies.

Tool shown 272080



QVari-LR 4 flute variable end mill for stainless and HRSA

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Chamfer x 45°	Teeth Z	Stock code
6.00	6.00	5.50	80.00	17.00	35.00	0.08	4	272060
8.00	8.00	7.50	100.00	25.00	50.00	0.10	4	272080
10.00	10.00	9.50	100.00	28.00	50.00	0.15	4	272100
12.00	12.00	11.50	100.00	30.00	50.00	0.15	4	272120
16.00	16.00	15.50	145.00	38.00	75.00	0.20	4	272160
20.00	20.00	19.30	165.00	45.00	75.00	0.20	4	272200

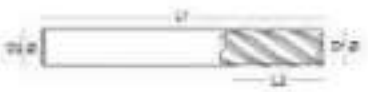
See pages 71 and 72 for cutting data

QVari 5 QVari 5CR
High Performance End Mills

High feed rates
with reduced vibration

QVari-5 is a high performance 5 flute variable solid carbide end mill designed to enable high feed rates with reduced vibration for stable machining. QVari-5CR is our optional corner radii cutter.

The XRed coating enhances tool life and makes this tool very suitable for steels, stainless steel, titanium and super alloys. QVari-5 is an excellent tool for applying trochoidal machining strategies.



QVari-5 & QVari-5CR 5 flute variable end mill for stainless/HRSA

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	Chamfer x 45°	R mm	Teeth Z	Stock code
6.00	6.00	58.00	13.00	0.08	-	5	172060
6.00	6.00	58.00	13.00	-	0.50	5	172061
6.00	6.00	58.00	13.00	-	1.00	5	172062
8.00	8.00	64.00	20.00	0.10	-	5	172080
8.00	8.00	64.00	20.00	-	0.50	5	172081
8.00	8.00	64.00	20.00	-	1.00	5	172082
10.00	10.00	73.00	22.00	0.15	-	5	172100
10.00	10.00	73.00	22.00	-	0.50	5	172101
10.00	10.00	73.00	22.00	-	1.00	5	172102
12.00	12.00	84.00	28.00	0.15	-	5	172120
12.00	12.00	84.00	28.00	-	0.50	5	172121
12.00	12.00	84.00	28.00	-	1.00	5	172122
16.00	16.00	93.00	34.00	0.20	-	5	172160
16.00	16.00	93.00	34.00	-	0.50	5	172161
16.00	16.00	93.00	34.00	-	1.00	5	172162
20.00	20.00	105.00	45.00	0.20	-	5	172200

See pages 71 and 72 for cutting data

QVari 7
High Performance End Mills

Trochoidal milling
with high MRR

QVari-7 is a high performance multi-flute end mill especially suited for trochoidal milling in stainless steels, PH-stainless, titanium and other HRSA materials.

High feed rates with low width of cut and full flute engagement results in high MRR. With high core strength this tool provides highly stable cutting in many applications.

QVari-7 comes with chip breakers as standard for excellent swarf management.

QVari-7 7 flute variable end mill for stainless/HRSA

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	R mm	Teeth Z	Stock code
6.00	6.00	58.00	18.00	0.50	7	788060
8.00	8.00	64.00	24.00	0.50	7	788080
10.00	10.00	73.00	30.00	0.50	7	788100
10.00	10.00	73.00	30.00	1.00	7	788105
12.00	12.00	84.00	36.00	0.50	7	788120
12.00	12.00	84.00	36.00	1.00	7	788125
16.00	16.00	93.00	48.00	0.50	7	788160
16.00	16.00	93.00	48.00	1.00	7	788165

See pages 71 and 72 for cutting data

Tool shown 788080

QPlus2
High Performance End Mills

Extended reach
reduced costs

QPlus2 is a performance tool for many general machine shop operations and applications. An excellent go-to tool with the benefit of extra flute lengths above the standard.

Designed with sharp corner geometry this tool is very useful when looking to achieve square corners in manufactured parts.

Tool shown 497025

Tool shown 497100

QPlus2 4 flute variable end mill for a wide range of materials

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Teeth Z	Stock code
1.00	3.00	0.95	39.00	3.00	8.00	4	497010
1.50	3.00	1.45	39.00	6.00	11.00	4	497015
2.00	3.00	1.95	39.00	9.00	15.00	4	497020
2.50	3.00	2.45	39.00	12.00	18.00	4	497025
3.00	3.00	-	39.00	12.00	-	4	497030
3.50	6.00	3.45	58.00	12.00	20.00	4	497035
4.00	6.00	3.95	58.00	14.00	20.00	4	497040
4.50	6.00	4.45	58.00	14.00	20.00	4	497045
5.00	6.00	4.95	58.00	16.00	22.00	4	497050
5.50	6.00	5.45	58.00	16.00	22.00	4	497055
6.00	6.00	-	58.00	19.00	-	4	497060
8.00	8.00	-	64.00	22.00	-	4	497080
10.00	10.00	-	73.00	25.00	-	4	497100
12.00	12.00	-	84.00	30.00	-	4	497120
16.00	16.00	-	93.00	40.00	-	4	497160
20.00	20.00	-	105.00	45.00	-	4	497200

See page 72 for cutting data

QPlus2-LS
High Performance End Mills

Long Series
for improved access

Tool shown 749200

The QPlus2-LS (Long Series) 4 flute universal carbide end mill with MX coating is suitable for steels, cast irons and some stainless steels.

Remember, QPlus2-LS can be adapted to suit your applications and operations. If you don't see the specification you need in the table below please contact us and ask about Infinite Possibilities®

QPlus2-LS 4 flute variable end mill for a wide range of materials

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	Teeth Z	Stock code
3.00	3.00	60.00	25.00	4	749030
4.00	4.00	60.00	25.00	4	749040
5.00	5.00	75.00	25.00	4	749050
6.00	6.00	80.00	30.00	4	749060
8.00	8.00	100.00	35.00	4	749080
10.00	10.00	100.00	40.00	4	749100
12.00	12.00	100.00	50.00	4	749120
16.00	16.00	125.00	65.00	4	749160
20.00	20.00	165.00	80.00	4	749200

Tool shown 749030

ZODIAC

High Performance Ball Nose End Mills

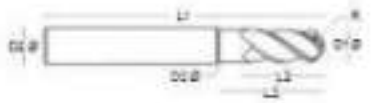
Tool shown 495918

A stellar performer

The Zodiac 4 flute ball nose is based on our exceptional Mirage end mill and brings a new dimension to ball nose end milling.

Four flutes provide for highly efficient swarf evacuation and enable high speed and feed machining with great stability. Whether contour milling or profiling this tool excels at roughing, semi-finishing, finishing and super-finishing in a wide range of materials.

Tool shown 495915



Zodiac 4 flute ball nose for super alloys, titanium and stainless steel

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
3.00	6.00	2.80	58.00	10.00	15.00	1.50	4	495906
4.00	6.00	3.80	58.00	11.00	16.00	2.00	4	495908
5.00	6.00	4.70	58.00	13.00	18.00	2.50	4	495914
6.00	6.00	5.60	58.00	13.00	20.00	3.00	4	495915
8.00	8.00	7.50	64.00	16.00	27.00	4.00	4	495916
10.00	10.00	9.50	73.00	22.00	32.00	5.00	4	495917
12.00	12.00	11.50	84.00	26.00	38.00	6.00	4	495918
16.00	16.00	15.50	92.00	32.00	44.00	8.00	4	495944

See page 75 for cutting data

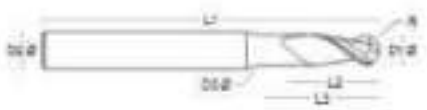
GLADIATOR
High Performance Ball Nose End Mills

A real **winner**

Tool shown 195916

This world beating 2 flute ball nose cutter is used to great effect on a variety of components in the F1/motorsport industry as well as in mould and die, general engineering and on components such as turbine blades.

Whether used with a 90° or 10-15° tilt approach Gladiator is a stable and accurate tool allowing for high speed cutting and machining. It is suitable for roughing, semi-finishing, finishing and super-finishing with profile, copy or contour milling.



Gladiator 2 flute ball nose for steels

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
3.00	6.00	2.80	58.00	5.00	14.00	1.50	2	195912
4.00	6.00	3.80	58.00	8.00	14.00	2.00	2	195913
5.00	6.00	4.80	58.00	10.00	17.00	2.50	2	195914
6.00	6.00	-	58.00	12.00	-	3.00	2	195915
8.00	8.00	-	64.00	16.00	-	4.00	2	195916
10.00	10.00	-	73.00	20.00	-	5.00	2	195917
12.00	12.00	-	84.00	26.00	-	6.00	2	195918

See page 75 for cutting data

Tool shown 195913

QBall
High Performance Ball Nose End Mills

Unique geometry
for most applications

The QBall 4 flute universal carbide ball nose with MX coating is suitable for a wide range of materials, from steels through to exotic alloys. Its unique geometry makes this tool suitable for most applications.

Tool shown 336010

Tool shown 336050

- Latest MX PVD coating developed specifically for aggressive machining conditions in steels and cast iron
- Maintains sharp edges and is also suitable for remanufacture and recoating
- HV hardness 3300, 2–4µ thickness, <0.6 coefficient of friction PVD AlTiN and micro hardness of >50GHv

QBall 4 flute ball nose end mill for a wide range of materials

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
1.00	3.00	39.00	4.00	5.00	0.50	4	336010
1.50	3.00	39.00	4.50	5.00	0.75	4	336015
2.00	3.00	39.00	6.50	8.00	1.00	4	336020
2.50	3.00	39.00	9.50	11.50	1.25	4	336025
3.00	3.00	39.00	12.00	-	1.50	4	336030
4.00	4.00	51.00	12.00	-	2.00	4	336040
5.00	5.00	51.00	14.00	-	2.50	4	336050
6.00	6.00	58.00	16.00	-	3.00	4	336060
8.00	8.00	64.00	20.00	-	4.00	4	336080
10.00	10.00	73.00	22.00	-	5.00	4	336100
12.00	12.00	84.00	26.00	-	6.00	4	336120
16.00	16.00	93.00	32.00	-	8.00	4	336160
20.00	20.00	105.00	35.00	-	10.00	4	336200

See page 75 for cutting data

QChamfer
High Performance Chamfer Mills

Chamfer and more
in all materials

Tool shown 189040

Tool shown 189080

QChamfer can be used for many machining operations from chamfering to bevelling, deburring, spotting and countersinking.

Our Infinite Possibilities® programme means we can adapt this tool to suit your operation. Consider QChamfer for deburring the component while still on the machine to reduce manual deburring.

Our standard QChamfer has a 90° inclusive point angle and comes with our CXPlus coating which is recommended for applications in low/high tensile steels, cast irons, tool steels, stainless steels, titanium and nickel alloys.

QChamfer 4 flute chamfer mill for a wide range of materials

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	Teeth Z	Stock code
4.00	4.00	51.00	11.00	4	189040
6.00	6.00	58.00	13.00	4	189060
8.00	8.00	64.00	19.00	4	189080
10.00	10.00	73.00	22.00	4	189100
12.00	12.00	84.00	26.00	4	189120

See page 71 for cutting data

QAlu
High Performance End Mills

Tool shown 721160

Balanced 3 flute
for high speed milling

Ramping and plunging at high feeds

Sharp corner edge geometry for clean cutting and finishing

- TX-R is a ta-C PVD Arc coating with a thickness of <0.5µm
- Hardness HV 0.02 >6000
- Oxidation temperature 500°C
- Coefficient of friction <0.1
- Process temperature below 180°C
- Very good, typically class 1 adhesion

Tool shown 721030

The QAlu is a high performance 3 flute solid carbide end mill designed with 3 teeth to centre for balanced HSM.

Open gullets within the geometry allow for ramping and plunging at higher feed rates while the TX-R coating and polished flutes enhance performance and finish. QAlu is excellent for roughing and finishing.

Designed with sharp corner geometry QAlu is ideal for machining square corners in manufactured parts.

QAlu 3 flute end mill for aluminium alloys and non-ferrous materials

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	Teeth Z	Stock code
3.00	3.00	50.00	12.00	3	721030
4.00	4.00	51.00	16.00	3	721040
5.00	5.00	51.00	20.00	3	721050
6.00	6.00	58.00	24.00	3	721060
8.00	8.00	64.00	25.00	3	721080
10.00	10.00	73.00	27.00	3	721100
12.00	12.00	84.00	32.00	3	721120
16.00	16.00	93.00	39.00	3	721160
20.00	20.00	105.00	42.00	3	721200

See page 76 for cutting data

QAlu-CR
High Performance Roughing End Mills

A coated 3 flute
for excellent surface finishes

QAlu-CR is a high performance 3 flute solid carbide end mill with corner radii for machining aluminium and non-ferrous materials. The special 3 flute geometry and TX-R coating enhances tool life and achieves excellent surface finishes.

Tool shown 124121

Tool shown 124204

Tool shown 124030

Tooling images are for illustrative purposes only and are not actual size.

QAlu-CR 3 flute roughing end mill for aluminium alloys and non-ferrous materials

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	R mm	Teeth Z	Stock code
3.00	3.00	50.00	12.00	0.25	3	124000
3.00	3.00	50.00	12.00	0.50	3	124001
3.00	3.00	50.00	12.00	0.75	3	124002
4.00	4.00	51.00	16.00	0.25	3	124040
4.00	4.00	51.00	16.00	0.50	3	124041
4.00	4.00	51.00	16.00	0.75	3	124042
5.00	5.00	51.00	20.00	0.25	3	124050
5.00	5.00	51.00	20.00	0.50	3	124051
5.00	5.00	51.00	20.00	0.75	3	124052
6.00	6.00	58.00	24.00	0.50	3	124060
6.00	6.00	58.00	24.00	1.00	3	124061
6.00	6.00	58.00	24.00	1.50	3	124062
6.00	6.00	58.00	24.00	2.00	3	124063
8.00	8.00	64.00	25.00	0.50	3	124080
8.00	8.00	64.00	25.00	1.00	3	124081
8.00	8.00	64.00	25.00	1.50	3	124082
8.00	8.00	64.00	25.00	2.00	3	124083
8.00	8.00	64.00	25.00	3.00	3	124084
10.00	10.00	73.00	27.00	0.50	3	124100
10.00	10.00	73.00	27.00	1.00	3	124101
10.00	10.00	73.00	27.00	1.50	3	124102
10.00	10.00	73.00	27.00	2.00	3	124103
10.00	10.00	73.00	27.00	3.00	3	124104
12.00	12.00	84.00	32.00	0.50	3	124120
12.00	12.00	84.00	32.00	1.00	3	124121
12.00	12.00	84.00	32.00	1.50	3	124122
12.00	12.00	84.00	32.00	2.00	3	124123
12.00	12.00	84.00	32.00	3.00	3	124124
16.00	16.00	93.00	39.00	0.50	3	124160
16.00	16.00	93.00	39.00	1.00	3	124161
16.00	16.00	93.00	39.00	1.50	3	124162
16.00	16.00	93.00	39.00	2.00	3	124163
16.00	16.00	93.00	39.00	3.00	3	124164
20.00	20.00	105.00	42.00	0.50	3	124200
20.00	20.00	105.00	42.00	1.00	3	124201
20.00	20.00	105.00	42.00	1.50	3	124202
20.00	20.00	105.00	42.00	2.00	3	124203
20.00	20.00	105.00	42.00	3.00	3	124204

See page 76 for cutting data

QAlu-R

High Performance Roughing End Mills

Trochoidal roughing
of aluminium

Tool shown 942120

QAlu-R is a high performance aluminium cutter with flat-crested-style geometry for enhanced performance in roughing applications.

QAlu-R can be used in conventional and trochoidal machining strategies with lower power requirements. It has variable index and helix and comes with TX-R coating.

End-users are telling us how hard they can push QAlu-R without any detrimental effect on the tool or part.

Tool shown 942060

QAlu-R 3 flute roughing end mill for aluminium alloys and non-ferrous materials

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Chamfer x 45°	Teeth Z	Stock code
6.00	6.00	5.70	58.00	13.00	23.00	0.10	3	942060
8.00	8.00	7.70	64.00	18.00	28.00	0.20	3	942080
10.00	10.00	9.50	73.00	21.00	31.00	0.25	3	942100
12.00	12.00	11.50	84.00	25.00	35.00	0.30	3	942120
16.00	16.00	15.30	93.00	32.00	50.00	0.45	3	942160
20.00	20.00	19.30	105.00	40.00	60.00	0.50	3	942200

See page 76 for cutting data

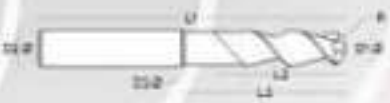
ALLIGATOR DUO Ball nose
High Performance Ball nose End Mills

The ball nose **with bite**

The Alligator Duo 2 flute ball nose is part of our successful Alligator end mill range and offers exceptional performance in non-ferrous materials including aluminium and aluminium alloys.

Copy milling, contour milling and profile milling are all strategies where this tool excels, providing a high degree of swarf removal and resistance to tool wear.

Our standard uncoated Duo ball nose comes in 6.00 to 16.00mm diameter and up to 93.00mm overall length and is ideal for most applications.



Alligator Duo 2 flute ball nose for aluminium

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
6.00	6.00	5.80	58.00	18.00	30.00	3.00	2	298415
8.00	8.00	7.80	64.00	18.00	30.00	4.00	2	298475
10.00	10.00	9.80	70.00	22.00	35.00	5.00	2	298481
12.00	12.00	11.80	84.00	26.00	45.00	6.00	2	298479
16.00	16.00	15.80	93.00	32.00	50.00	8.00	2	298480

RIBCUTTER

High Performance Rib-Type Ball Nose End Mills

Reaches
the parts...

Tool shown 309045

CKPlus coating for smooth operations and extended tool life

Our Ribcutter ball nose end mills are designed to overcome a multitude of production issues where small diameter tools are required.

As parts become smaller and more intricate and the finest finishes are called for, these tools hit the spot every time.

Solid carbide and coated with our unique CKPlus coating they are ideally suited for use in aluminium, titanium and stainless steels.

Ribcutter is available ex-stock or on a short delivery. Other sizes are available as part of our Infinite Possibilities® range.

Neck relief for improved access

Tool shown 309020

Tool shown 309010

Sizes from 0.30mm Ø (1.90mm Ø shown)

Ribcutter 2 flute ball nose end mill for aluminium alloys, stainless and titanium

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 Ø mm	L2 Ø mm	L3 Ø mm	R Ø mm	Teeth Z	Stock code
0.30	4.00	0.29	50.00	0.30	3.00	0.15	2	309230
0.30	4.00	0.29	50.00	0.30	6.00	0.16	2	309231
0.40	4.00	0.38	50.00	0.40	4.00	0.20	2	309240
0.40	4.00	0.38	50.00	0.40	8.00	0.21	2	309241
0.50	4.00	0.48	50.00	0.50	3.00	0.25	2	309250
0.50	4.00	0.48	50.00	0.50	5.00	0.25	2	309251
0.60	4.00	0.58	50.00	0.60	5.00	0.30	2	309260
0.60	4.00	0.58	50.00	0.60	12.00	0.30	2	309261
0.80	4.00	0.78	50.00	0.80	5.00	0.40	2	309280
0.80	4.00	0.78	50.00	0.80	10.00	0.40	2	309281
0.80	4.00	0.78	50.00	0.80	16.00	0.40	2	309282
1.00	4.00	0.95	50.00	1.00	3.00	0.50	2	309010
1.00	4.00	0.95	50.00	1.00	6.00	0.50	2	309015
1.00	4.00	0.95	50.00	1.00	10.00	0.50	2	309016
1.00	4.00	0.95	50.00	1.00	15.00	0.50	2	309017
1.00	4.00	0.95	50.00	1.00	20.00	0.50	2	309018
1.20	4.00	1.15	50.00	1.20	7.00	0.60	2	309120
1.20	4.00	1.15	50.00	1.20	15.00	0.60	2	309121
1.20	4.00	1.15	50.00	1.20	20.00	0.60	2	309122
1.50	4.00	1.45	50.00	1.50	9.00	0.75	2	309150
1.50	4.00	1.45	50.00	1.50	15.00	0.75	2	309151
1.50	4.00	1.45	50.00	1.50	20.00	0.75	2	309152
1.50	4.00	1.45	50.00	1.50	30.00	0.75	2	309153
2.00	4.00	1.90	50.00	2.00	8.00	1.00	2	309021
2.00	4.00	1.90	50.00	2.00	12.00	1.00	2	309020
2.00	4.00	1.90	50.00	2.00	16.00	1.00	2	309025
2.00	4.00	1.90	50.00	2.00	20.00	1.00	2	309022
2.00	4.00	1.90	50.00	2.00	30.00	1.00	2	309023
2.00	4.00	1.90	50.00	2.00	40.00	1.00	2	309024
2.50	4.00	2.40	60.00	2.50	15.00	1.25	2	309026
2.50	4.00	2.40	60.00	2.50	25.00	1.25	2	309027
2.50	4.00	2.40	60.00	2.50	35.00	1.25	2	309028
3.00	6.00	2.90	60.00	3.00	16.00	1.50	2	309030
3.00	6.00	2.90	60.00	3.00	20.00	1.50	2	309035
3.00	6.00	2.90	60.00	3.00	30.00	1.50	2	309031
3.00	6.00	2.90	60.00	3.00	45.00	1.50	2	309032
4.00	6.00	3.90	60.00	4.00	15.00	2.00	2	309040
4.00	6.00	3.90	60.00	4.00	20.00	2.00	2	309045
4.00	6.00	3.90	60.00	4.00	30.00	2.00	2	309041
4.00	6.00	3.90	60.00	4.00	45.00	2.00	2	309042
5.00	6.00	4.90	60.00	5.00	15.00	2.50	2	309050
5.00	6.00	4.90	60.00	5.00	20.00	2.50	2	309051

See page 75 for cutting data

CAIMAN

High Performance End Mills

The choice

for 6000/7000 series aluminium

Tool shown 698211

The Caiman is fast becoming the preferred tool when machining F1-critical 6000 and 7000 series aluminium. Roughing and finishing applications at high speeds and feed rates are where this tool really performs.

Combine this with trochoidal milling where 25%+ width of cut (a_e) and depth of cuts (a_p) of 2-3 x D are possible, this tool provides high levels of MRR and excellent swarf evacuation resulting in very long tool life.

Superior grinding and reinforced flutes

Optimised flute design for maximum chip space and swarf evacuation

Tool shown 698405

Caiman 3 flute end mill for 6000/7000 series aluminium

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Square corner	Teeth Z	Stock code
3.00	6.00	2.80	58.00	8.00	13.00	Yes	3	698405
4.00	6.00	3.60	58.00	12.00	18.00	Yes	3	698406
5.00	6.00	4.70	58.00	14.00	20.00	Yes	3	698407
6.00	6.00	-	58.00	14.00	-	Yes	3	698408
8.00	8.00	-	64.00	19.00	-	Yes	3	698409
10.00	10.00	-	73.00	22.00	-	Yes	3	698410
12.00	12.00	-	84.00	26.00	-	Yes	3	698411
16.00	16.00	-	93.00	32.00	-	Yes	3	698412
20.00	20.00	-	105.00	38.00	-	Yes	3	698413

See page 76 for cutting data

F1 special with 5 flutes and chip breakers

DEMON
High Performance End Mills

The strong **finisher**

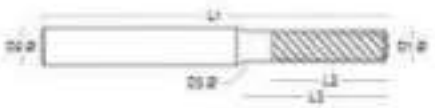
Tool shown 9286D16

The Demon multiflute end mill will provide you with unrivalled high performance.

Designed for super-fine finishing applications in a wide range of components and materials, our unique geometry is the precise recipe to ensure highly accurate machining of any surface requiring a superb finish.

Ideal for profile milling in steels, hardened steels and exotics, Demon's higher speeds and feeds rates deliver increased productivity and high material removal rates.

Tool shown 9286D6



Demon 8 flute end mill for finishing operations

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Square corner	Teeth Z	Stock code
3.00	6.00	2.95	58.00	5.00	10.00	Yes	6	9286D3
4.00	6.00	3.95	58.00	8.00	13.50	Yes	6	9286D4
5.00	6.00	4.95	58.00	10.00	15.00	Yes	6	9286D5
6.00	6.00	-	58.00	12.00	-	Yes	6	9286D6
8.00	8.00	-	64.00	20.00	-	Yes	8	9286D8
10.00	10.00	-	73.00	25.00	-	Yes	8	9286D10
12.00	12.00	-	84.00	30.00	-	Yes	8	9286D12
16.00	16.00	-	92.00	40.00	-	Yes	8	9286D16

See page 72 for cutting data

SPECTRE

High Feed End Mills

High feed, **high ROI**

This solid carbide coated high feed tool was initially developed with 3 flutes to machine deep pockets for a UK-based Formula 1 team.

As with all our high feed tools the large radii enables excellent stability when roughing at high feed rates. The combination of our unique geometry, small depth of cut and high feed means clients realise a very good return on investment.

In addition, cycle times are reduced resulting in greatly improved production throughput.

Tool shown 196201

Spectro 3 flute high feed end mill

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R1/R2 mm	Teeth Z	Stock code
3.00	6.00	2.75	58.00	1.20	32.00	0.25/2.00	3	196201
6.00	6.00	5.20	58.00	4.00	26.00	0.50/4.00	3	196202
6.00	6.00	5.20	80.00	4.00	34.00	0.50/4.00	3	196203
8.00	8.00	7.00	80.00	6.00	40.00	0.67/5.33	3	196204
8.00	8.00	7.00	64.00	6.00	30.00	0.67/5.33	3	196234
10.00	10.00	9.00	80.00	6.00	40.00	1.25/6.75	3	196205
12.00	12.00	10.40	100.00	8.50	50.00	1.50/8.00	3	196206
12.00	12.00	10.40	84.00	8.50	30.00	1.50/8.00	3	196216

See page 73 for cutting data

SMALLER Ø AVAILABLE - ASK YOUR ACCOUNT MANAGER

PHANTOM
High Feed End Mills

Four flutes, **extended life**

Phantom is a 4 flute that performs like a 16 flute. A development of our Spectre the Phantom is a lens type tool that has been designed to be remanufactured many times using our QuickEdge process.

Phantoms achieve 5-6x tool life over normal end mills in roughing operations and have become firm favourites in motorsport and aerospace, where they are used to machine titanium and stainless steel.

A relatively small depth of cut at high feed delivers great advantages to engineers and programmers.

Tool shown 196306

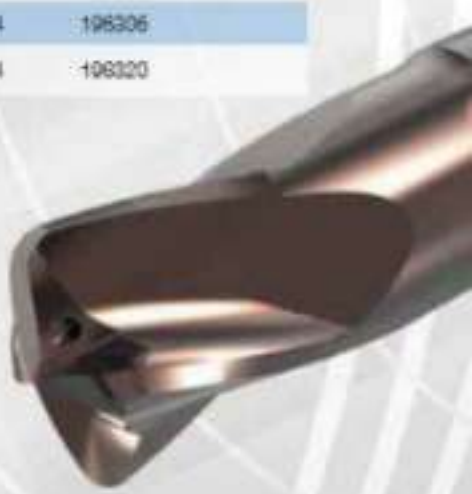
Phantom 4 flute high feed lens tool

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R1/R2 mm	Teeth Z	Stock code
6.00	6.00	5.75	58.00	6.00	24.00	1.20/9.00	4	196360
8.00	8.00	7.50	64.00	8.00	26.00	1.60/12.00	4	196380
10.00	10.00	9.50	73.00	10.00	30.00	2.00/15.00	4	196301
12.00	12.00	11.00	84.00	6.00	50.00	2.00/20.00	4	196312
16.00	16.00	15.00	93.00	8.00	50.00	2.50/25.00	4	196306
20.00	20.00	19.00	105.00	20.00	50.00	3.00/32.00	4	196320

See page 73 for cutting data

Tool shown 196312

F1 special with through coolant feature; multiflute also available



ORBIS

High Technology Lollipop Cutters

A new standard
for complex components

Tool shown 866083

Our Orbis high technology lollipop cutters are designed for multiple applications in virtually all materials from aluminium to peek, stainless steel to titanium and more.

Lollipop tools are often only used for undercuts and de-burring. Orbis, with its new CXPlus coating, is setting new standards of unrivalled high performance and surface finish in applications and component features that have previously caused many issues.

Tool shown 866033

Spherical cutting in all directions

Applications and features

- Spherical cutting in all directions
- Options of neck reach and diameter
- High speed cutting
- Machine manifolds and ports
- Helical interpolation
- Milling of complex thin walled components
- Machining contour shapes
- CXPlus coating for long life and the optimum cutting edge

Orbis 4 flute lollipop cutters for mixed materials

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Spherical head °	Teeth Z	Stock code
2.00	6.00	1.00	80.00	30.00	6.00	270°	4	866020
2.00	6.00	1.30	80.00	36.00	10.00	270°	4	866023
2.00	6.00	1.30	80.00	42.00	16.00	270°	4	866026
3.00	6.00	2.00	80.00	30.00	9.00	270°	4	866030
3.00	6.00	2.00	80.00	36.00	15.00	270°	4	866033
3.00	6.00	2.00	80.00	42.00	21.00	270°	4	866036
4.00	6.00	2.70	80.00	30.00	12.00	270°	4	866040
4.00	6.00	2.70	80.00	36.00	20.00	270°	4	866043
4.00	6.00	2.70	100.00	42.00	32.00	270°	4	866046
6.00	6.00	4.00	80.00	28.00	18.00	270°	4	866060
6.00	6.00	4.00	80.00	40.00	30.00	270°	4	866063
6.00	6.00	4.00	100.00	44.00	32.00	270°	4	866066
8.00	8.00	5.40	100.00	38.00	24.00	270°	4	866080
8.00	8.00	5.40	100.00	54.00	40.00	270°	4	866083
8.00	8.00	5.40	100.00	68.00	55.00	270°	4	866086
10.00	10.00	6.70	100.00	48.00	30.00	270°	4	866100
10.00	10.00	6.70	100.00	58.00	40.00	270°	4	866103
10.00	10.00	6.70	100.00	68.00	55.00	270°	4	866106
12.00	12.00	8.00	100.00	58.00	36.00	270°	4	866120
12.00	12.00	8.00	100.00	68.00	55.00	270°	4	866126
16.00	16.00	10.70	100.00	54.00	48.00	270°	4	866160
16.00	16.00	10.70	100.00	68.00	55.00	270°	4	866166

Please contact your local Account Manager for cutting data

ELIMINATOR
Conical Barrel Tools

Two tools
in one

Reduces cycle times by up to **90%**

Tool shown 307208

We work with F1 and motorsport clients to help reduce cycle times on features that require the best surface finish such as wings and wind tunnel parts with deep cavities.

Quickgrind's Eliminator barrel tools give a comparable or superior finish to typically-used ball nose cutters but in a fraction of the time.

Highly efficient at finishing and semi-finishing Eliminator's conical geometry is ideal for profiling flanks, steep walls, flat planes and faces with minimal curvature. In terms of cycle times, the increased ap (step down) and reduced tool path distances can save you up to 90% on machining times. Smaller cusp (scallop) heights lead to a low Ra finish and reduced effects of thermal deformation (heat transfer) give you longer tool life.

A choice of coatings for a wide range of materials

Type A | Uncoated

- Non-ferrous N
  - Aluminium 6061/6082
  - Die-cast aluminium 10% Si

Type D | MX coated

- Steels P
  - Low alloy 1000/1100/1300
  - Medium alloy 200/252/300
  - Tool steels H13/P20/D2
  - High strength 420/S126
- Cast iron K
  - Grey cast iron
  - SG iron
- Hardened steels H
  - Hardened steels 45-55 Hrc

Type S | XRed coated

- Stainless M
  - Precipitation 13-8/15-5 17-4PH
  - Austenitic 303/304/316L
  - Martensitic 403/410/416
- High temp alloys S
  - Inconel Hastelloy Incoloy
  - Titanium alloys Ti6Al4V Ti6Al-2V-2Mo

For lens and form-F barrel tools ask for our Eliminator brochure or download from our website

Eliminator conical barrel tool

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	R1 mm	R2 mm	R3 mm	Teeth Z	α/2	Type	Stock code
2.00	6.00	58.00	8.50	1.00	250	2.00	2	20.00	A	862503
2.00	6.00	58.00	8.50	1.00	250	2.00	3	20.00	D	862503
2.00	6.00	58.00	8.50	1.00	250	2.00	3	20.00	S	872503
3.00	8.00	64.00	10.50	1.50	250	4.00	3	20.00	A	197202
3.00	8.00	64.00	14.50	1.50	1000	4.00	3	12.50	A	797202
3.00	8.00	64.00	10.50	1.50	250	4.00	3	20.00	D	207202
3.00	8.00	64.00	14.50	1.50	1000	4.00	3	12.50	D	897202
3.00	8.00	64.00	10.50	1.50	250	4.00	3	20.00	S	307202
3.00	8.00	64.00	14.50	1.50	1000	4.00	3	12.50	S	997202
4.00	10.00	73.00	12.50	2.00	250	5.00	3	20.00	A	197203
4.00	10.00	73.00	16.50	2.00	1000	5.00	3	12.50	A	797203
4.00	10.00	73.00	12.50	2.00	250	5.00	3	20.00	D	207203
4.00	10.00	73.00	16.50	2.00	1000	5.00	3	12.50	D	897203
4.00	10.00	73.00	12.50	2.00	250	5.00	3	20.00	S	307203
4.00	10.00	73.00	16.50	2.00	1000	5.00	3	12.50	S	997203
6.00	12.00	84.00	13.50	3.00	250	6.00	3	20.00	A	197204
6.00	12.00	84.00	19.50	3.00	1000	6.00	3	12.50	A	797204
6.00	12.00	84.00	13.50	3.00	250	6.00	3	20.00	D	207204
6.00	12.00	84.00	19.50	3.00	1000	6.00	3	12.50	D	897204
6.00	12.00	84.00	13.50	3.00	250	6.00	3	20.00	S	307204
6.00	12.00	84.00	19.50	3.00	1000	6.00	3	12.50	S	997204
8.00	16.00	93.00	18.50	4.00	500	8.00	3	20.00	A	197205
8.00	16.00	93.00	18.50	4.00	500	8.00	3	20.00	D	207205
8.00	16.00	93.00	18.50	4.00	500	8.00	3	20.00	S	307205
8.00	16.00	93.00	18.50	4.00	1500	8.00	3	20.00	A	197208
8.00	16.00	93.00	18.50	4.00	1500	8.00	3	20.00	D	207208
8.00	16.00	93.00	18.50	4.00	1500	8.00	3	20.00	S	307208

See page 74 for cutting data

S Standard tool – available ex-stock in the sizes shown

Also Infinite Possibilities® compatible – choose your spec (page 8)

ELIMINATOR
Tangential Barrel Tools

Transforming
finishing strategies

Tool shown 260012

Like its conical cousin our tangential barrel tool is designed to replace scanning with a ball nose or corner radius end mill (see page opposite). Cutting on the flank allows speeds to be maintained over the feature.

The tangential geometry provides what is effectively a two-in-one tool, giving you both side and ball nose cutting. Finishing and semi-finishing performance is excellent as are flank profiling operations and machining steep walls, flat planes and faces with minimal curvature.

With the correct CAM cycles tangential barrel tools are capable of optimised tool paths and strategies, accessing areas the conical cannot. We are an application partner with OPEN MIND *hyperMILL*® and work with many other CAM providers including EdgeCAM, SolidCAM and Siemens NX.

Eliminator barrel tools are suitable for sharpening and recoating multiple times with our QuickEdge programme, increasing your profitability while at the same time reducing your carbon footprint.

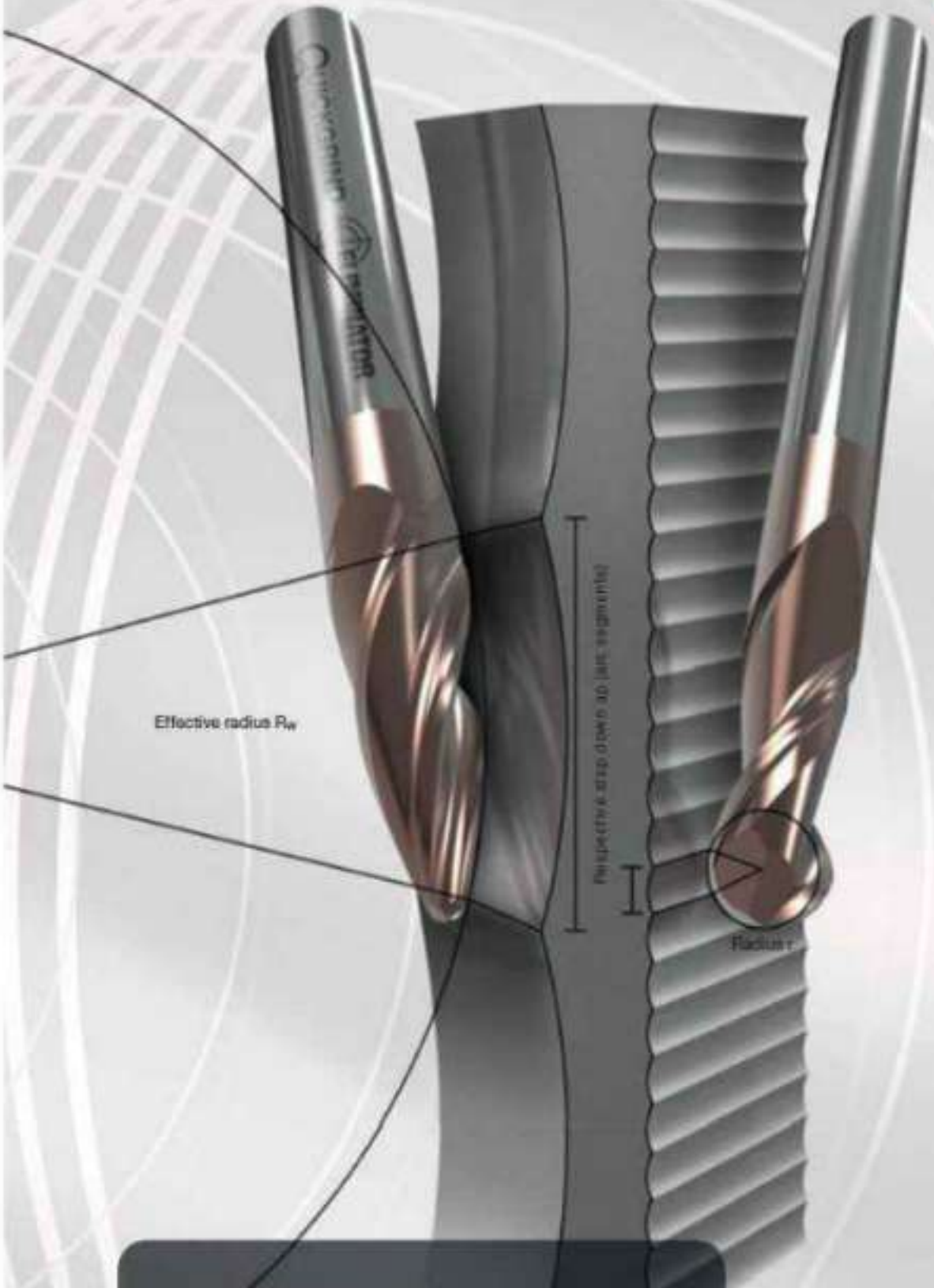
High temp alloys S		Stainless M		
Inconel Hastelloy Incoloy	Titanium alloys Ti6Al-4V Ti6Al-2Sn-4Zr-6Mo	Precipitation 13-8/15-5 17-4PH	Austenitic 303/304/316L	Martensitic 403/410/416

Eliminator tangential barrel tool

D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	R1 mm	R2 mm	Teeth Z	Geometry	Stock code
1.00	6.00	58.00	22.00	0.50	95	3	S	230060
1.00	8.00	64.00	25.00	0.50	90	3	S	230080
2.00	10.00	73.00	26.00	1.00	85	3	S	230010
2.00	12.00	84.00	28.00	1.00	80	3	S	230012
3.00	16.00	93.00	31.00	1.50	75	3	S	230016
4.00	10.00	73.00	26.00	2.00	85	6	S	260010
4.00	12.00	84.00	28.00	2.00	80	6	S	260012
6.00	16.00	93.00	31.00	3.00	75	6	S	260016

See page 74 for cutting data

For lens and form-F barrel tools ask for our Eliminator brochure or download from our website



Eliminator versus ballnose

Eliminator's large radius of curvature (R_e) gives an increased contact area making it possible to realise larger step down distances without any detrimental impact on the theoretical scallop height.

The result is highly accurate surfaces with excellent characteristics and finishes that can eliminate the need for polishing and other time consuming finishing techniques.

Strength with **durability**

Hypermills are an extremely useful tool for F1 and motorsport machinists and programmers.

Capable of milling deep cavity profiles without the need for long series tool holders, we design the taper neck to have sufficient reach and taper to overcome the reach issues on your component.

The weakest part of some tools is the area between the taper and the shank but our Hypermills are produced with a radius blend to give added strength and durability. This is especially relevant on small and miniature end mills where long reach necks are required.

Hypermills are available with 2, 3, 4 or more flutes and with square-end or corner radius. Flute lengths are generally 1.5-2.5xD. Shanks are tapered for added rigidity, with fillet radii for further strength.

Geometry and coatings, where required, are designed into your tool for optimum performance.

Get into the **groove**

Dovetail cutters are used in a broad range of applications and can be specified with taper angle, top and bottom diameters to suit your operation.

They are typically used to produce dovetail O-ring grooves in fluid and pressure components as well as industrial slides.

The trapezoidal 'dovetail' shape makes it important to understand the correct selection of cutting data in order to realise optimum results. The larger end diameter is used to calculate the speed while the smaller neck diameter is used when calculating the feed.

The most common cutters have 45° or 60° angles but we regularly produce tools with anything from 5° to 120° and with wide variations of corner radius.

We will work with you to achieve the optimum geometry, number of teeth and any coating to give you a smooth-cutting and efficient tool.

ALLIGATOR Taper Ball Nose
High Performance Ball Nose End Mills

Deep pockets
short flutes

Machining angled side walls is a common issue which is why we developed this tool with short flute lengths and tapered necks to give adequate clearance when profile-machining cavities.

Complex parts requiring angled walls are pushing the boundaries of feasibility for straight reach tools. A tapered reach tool brings many advantages due to the increased cross-section strength.

A taper of 2-5° will give 60-70% less deflection than a straight tool, resulting in less chatter, a far better surface finish and greatly improved tool life.

3 or 4 flutes for trouble-free machining

Our Infinite Possibilities® tool development programme means we can respond rapidly to our F1 and motorsport clients' requirements. Operating within challenging time constraints and always technically advanced, F1/motorsport is like no other industry – finding a flexible and innovative manufacturing partner is crucial.

Quickgrind fulfils this role for several teams and the tools shown on this page are examples of our can-do, problem-solving approach.

Based on the already successful Alligator Taper Ball Nose for aluminium, our F1 and motorsport clients needed a tool that could perform well in mission-critical titanium and stainless steel components.

These 'specials' come in a choice of 2 flutes as well as 3 and 4 flutes for trouble-free machining. Coating options include CXPlus which is suitable for both aluminium and titanium.

Call us today to arrange a visit from one of our sales engineers. Better still, visit our state-of-art Technical Centre where you can collaborate with us as your tooling is designed, developed and tested.

Innovation, quality and accuracy at speed.
That's the Quickgrind competitive advantage.

4 flutes for titanium and stainless (HPSA)

FUSION
High Performance Solid Carbide Composite Cutters

Conquering
composites

Quickgrind has been at the forefront of developing and manufacturing tools for the high productivity trimming, milling, routing, drilling and reaming of composite materials for many years.

Take our Dagger drills, used for producing accurate holes without delamination as they exit the hole. For even finer tolerance work we also offer our Dagger drill/ream.

Working with our clients we have developed some of the most efficient tooling for difficult-to-machine composite materials including CFRP (carbon fibre reinforced polymers), glass epoxy laminates, sandwich materials, engineered plastics and wood, where common issues include delamination, fibre pull-out, abrasion and thermal distortion.

Fusion-P for polymers

Fusion-M for metals

Fusion-C for carbons

@quickgrind

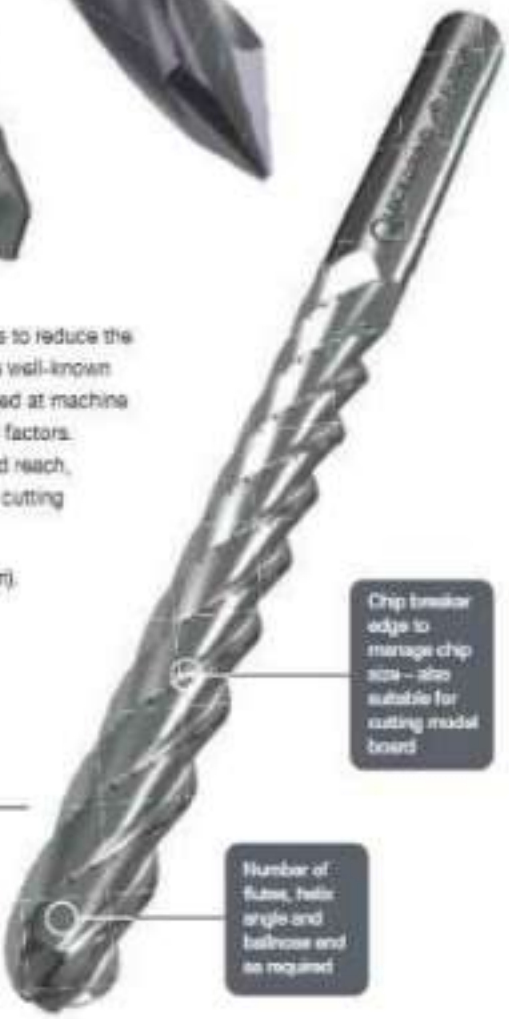
Dagger drills, drill/reamers

Our R&D team will analyse your manufacturing method and produce cutting tools to reduce the effects of vibration, heat, material build up and tool wear. When approached by a well-known aerospace manufacturer to improve the machining of glass epoxy board we looked at machine set-up, stability of workpiece, spindle power and swarf extraction amongst other factors. Using the correct mix of carbide grade, cutting edge geometry, length of flute and reach, coating and by introducing our Amrita anti-vibration technology, the result was a cutting tool that reduced their cycle times by 40% and improved tool life by 60%.

Other options include through-tool air blast or MQL (minimum quantity lubrication).

8 flute routers for sandwich material

Model board cutters



Rippers

Crown drills

Undercutting
with ease

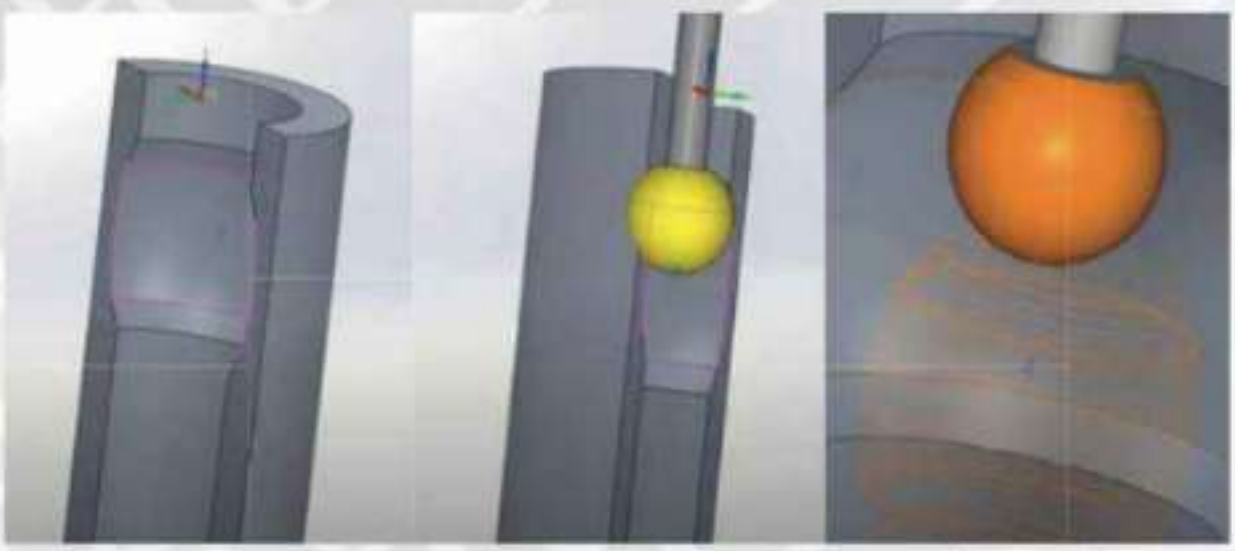
Undercut tools (sometimes called recess tools or clip cutters) are designed to produce features that are below an overhang feature.

The tool's end diameter and thickness, shank recess diameter and length, plus the shank diameter and overall length, can be produced to overcome the difficulties inherent when machining undercuts.

Based on the physical requirements and machinability of a feature we design the number of flutes, flute geometry and coating, if required, to give you the optimised tool for the most cost-effective results.

We will provide the tool with top and bottom radii if required plus the right number of teeth to allow for efficient cutting data to be used.

In some cases an undercut may require a lollipop-type cutter – please see our Orbis range on pages 34 and 35 or speak with your Account Manager.



Cutting strategy provided by SolidCAM, one of several CAM partners we work with

T-slotting
with accuracy

T-slot cutters are used to produce accurate keyways and T-slots in various components, often in tables and beds for machine tools. A slot must first be milled using endmills or slot drills to allow the neck of the tool to enter the slot.

Working with you and by understanding your requirements we will design a T-slot cutter with the geometry and specifications to suit your application.

We are often asked by our clients to provide T-slot cutters which require specific angles along with combinations of corner detail such as radii or chamfers on one or both corners, as shown below.

DIN or other shank standards as required

Geometry, flute number and radius combinations are virtually infinite

Complex forms
no problem

DIN or other shank standards as required

Port tools are essential for creating complex multi-diameter forms with ease.

These tools require the bores to be pre-drilled on accurate CNC machines. The port tool then follows on creating precise, detailed, accurate bores with dimensionally correct features.

The main uses for these time saving tools are on hydraulic ports and actuators.

From simple to complicated, our range of port tools is almost unlimited. Talk to us about your next project.

Through-coolant and other options

Three tools
in one

Interpolating a bore, thread and chamfer with one tool gives good cost savings and cycle time reduction. Introducing the Pathfinder threadmill.

Using three tools to produce the chamfer, the correct pre-threaded bore followed by a tap or threadmill can be replaced with one of our highly efficient Pathfinder drill-chamfer-threadmills. Having this one tool to do the work of three frees-up tool station space and counters any possible alignment issues.

Using a single pitch tool to produce more than one diameter thread such as a P1.00 is suitable for producing M6x1mm and MF7x1mm threads.

Pathfinders can achieve thread depths of 2xD and 3xD. Through-coolant and coated tools, which are recommended for 3xD in cast iron and aluminium applications, are available on a short delivery, as are long reach versions.

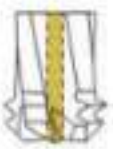
Tools are designed to suit your application and will be provided with the appropriate chamfer angle as required.

Pathfinders can be used for machining pre-cast threads or pre-drilled holes and again these will have the appropriate coating as required.

This tool is also suitable for internal threads in blind or through holes.

Thread systems include ISO Metric, American UN, BSP, NPT and BSPT.

Please note Pathfinder drill-chamfer-threadmills can have 1, 2, 3 or more full profile threads.



Two cutting teeth

2nd tooth – full profile (finishing)

1st tooth – partial profile (roughing)

TM-IT tools are left handed – for CNC use M04 code

Features and coatings to suit your applications

Specialised
tooling

Specialised tools are an every day requirement for F1 and motorsport engineers – the big issue is finding a capable and trusted tooling partner. Here at Quickgrind we pride ourselves on having the expertise to fulfil this crucial role.

On this page we show a couple of specialised form tools we have made to exacting requirements and by working in close relationship with our clients.

Geometry, flute number, radius combinations, coatings and other features are all virtually limitless, so don't hesitate to challenge us with your specialised tooling needs.

Multi-diameter holes
in one operation

Reaming is the process of enlarging and sizing a hole by means of a multi-fluted cutting tool. Our precision reamers are designed to enlarge the size of a previously formed hole by a small amount but with a high degree of accuracy to leave smooth sides.

We produce a wide variety of reamer types from straight fluted to spiral fluted in either right- or left-hand cutting.

We also produce step reamers which are used to follow on from our step drills all produced with the dimensions and flute configuration to suit your specific application.

Things to consider which affect the success of your reamed hole:

Pre-ream stock: Generally between 2 and 3% of the diameter is sufficient for most materials for example 2% for steels and tough materials and 3% for soft and non-ferrous materials.

Tools holders: Using hydraulic holders and precision collets is essential for successful reaming.

Tool overhang: Using tools that are too long (perhaps due selecting from a standard catalogue) will cause runout. By using the shortest tool possible you will alleviate most of the problems.

Workpiece clamping: Ensuring the component is securely held is a must to prevent tool breakage, oversized holes, poor finishes and shortened tool life.

Checking TIR: Check the reamer diameter with a dial indicator (at the circular margin). It is critical your reamer runs concentric with the machine spindle.

Corner rounding
and deburring made easy

Generally used to produce a specific radius on a component in one operation corner rounders can also be used to remove burrs or sharp edges.

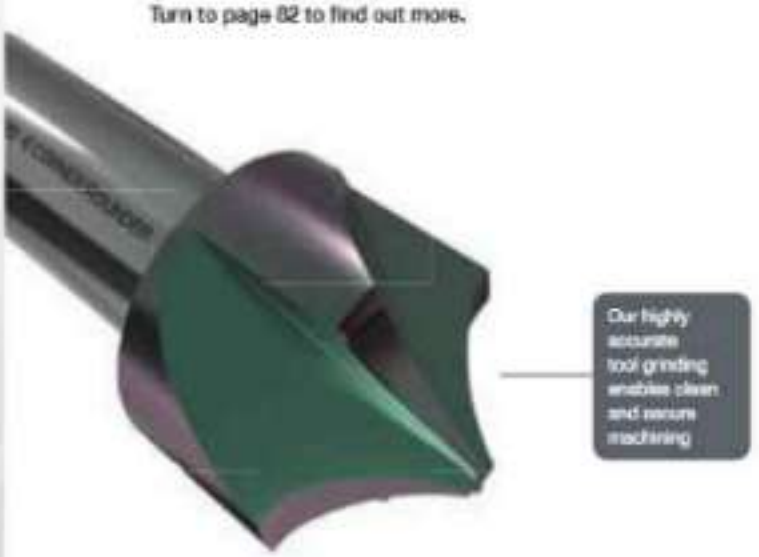
The pilot diameter significantly impacts the tool's performance. Larger pilot diameters enable the tool to operate at lower speeds while smaller ones allow for higher speeds due to their increased effective cutter radius. The effective cutter diameter can be calculated using these equations based on the radius-to-pilot ratio:

Radius/Pilot Ratio
< 2.5: Effective Cutter Diameter = Pilot Diameter + Radius

Radius/Pilot Ratio
≥ 2.5: Effective Cutter Diameter = Pilot Diameter + 0.7x Radius

Larger pilot diameters offer enhanced strength compared to smaller ones, thanks to the extra material behind the radius. Smaller pilots may be required for clearance in narrow slots or holes, facilitating tighter turns when machining inside corners.

Take advantage of our QuickEdge tool remanufacturing service to extend the life of these products even more and reduce costs.
Turn to page 82 to find out more.



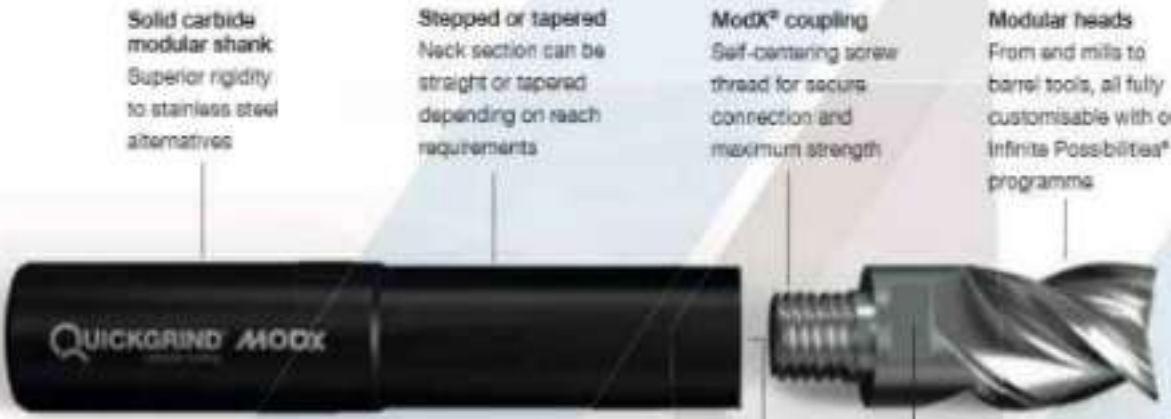
MODX

Two (three, four, five) heads
are better than one

Combining the performance and durability of solid carbide with the modularity of inserts the new ModX® range from Quickgrind gives you the best of both worlds, but without the compromise of either.

Features and benefits

- Carbide shank with 2µm tolerance for accurate, reliable machining
- Unique ModX® locking mechanism for maximum coupling stability between shank and head
- Modular shank system and interchangeable heads means reduced costs
- Infinite Possibilities® compatible – full customisation including shank length, head length, diameter, coatings and more
- QuickCam® compatible – we will work with you to produce the optimum machining strategies for your operations
- QuickEdge® compatible – heads can be remanufactured to as-new for up to 9x extra usage
- Cost-effective shipping – less weight equals reduced costs
- Environmentally friendly – reduces the need for virgin carbide, a finite natural resource



Look out for this icon throughout the rest of this brochure to discover which of our tools is ModX® compatible

End mills
A collection of 4 to 7 flute variable end mills with a choice of coatings and geometries for a wide range of materials and operations.

Ball nose end mills
A choice of 2 and 4 flute ball nose end mills with flute lengths to suit your applications and coatings to aid chip flow and resist wear.

Barrel tools
Revolutionising finishing and semi-finishing strategies and slashing cycle times by up to 90%, our barrel tools come in a wide range of geometries including conical, convex, tangential, lens and type-F.

Roughing end mills
This high performance aluminium cutter with flat-crested-style geometry has enhanced performance in roughing applications. It is ideal for conventional and trochoidal machining strategies and also has variable index and helix.

Aluminium cutters
A range of 2 to 3 flute end mills, ball nose end mills and roughing end mills designed for machining a wide range of aluminium alloys and other non-ferrous materials in F1 and motorsport.

High feed end mills
A selection of 3 to 5 flute tools with unique precision ground end geometries for lower cutting forces and highly efficient chip removal at high feed rates. Achieve up to 60% cycle time reductions.

Chamfer tools
Suitable for a wide range of materials and can be used for many machining operations from chamfering to bevelling, deburring, spotting and countersinking. Our standard chamfer tool has a 90° inclusive point angle.

Working with you to transform your operations

The modular heads you see here are just a selection of the tools we can offer. Talk to us about your machining operations and we will work with you to find the perfect combination of tool and cutting strategy to achieve the optimum results.

@quickgrind

> Quickgrind's ability to understand our quality standards and manufacturing process enables them to provide drills which achieve repeatable dimensional accuracy in hard-to-machine stainless steels. Their drills are also highly productive compared with off-the-shelf offerings from other suppliers, with tool life increasing by over 75%.

Any drill for any job

Here at Quickgrind we know that choosing the right drill for the right job isn't always easy. We understand the importance of selecting the tool to match your workpiece material and the specification required, and the effect this has on your bottom line.

You may not realise that Quickgrind makes such a huge variety of high performance drill designs, but we have always produced drills for dedicated applications, just like we do for any other type of tool we make. That is what Infinite Possibilities® is all about.

We can make virtually any type of drill specifically for your job, whether it is a new design or one that is already running with another manufacturer. We will either design a new drill for you to help you achieve your goals, or we will match the drills you use and optimise the design.

So if you are happy with your current drills but want to improve your tool life and your cycle times, we can help. We have the expertise, the highest specification CAD/CAM and machines plus a highly motivated R&D Technical Centre, together with decades of know-how to enable us to be extremely competitive not just in the UK but worldwide.

Wherever possible our drill designs will be suitable for remanufacture. High specification solid carbide drills are expensive and to gain an effective ROI must be used more than once. QuickEdge is our world-beating remanufacturing process that is far more than an average regrind – there are many processes involved to bring a tool back to as good as new. QuickEdge is ideally suited to high-use products where the financial benefits of multi-use tooling will show huge cost-downs to your organisation.

Of course, if you want an off-the-shelf tool we can do that too, but in our experience the benefits of dedicated tools, optimised for your applications, provide you with far more stable and consistent production.

Finally, when it comes to management of your tools, we can provide standard tools or make your own unique tools and store them in your premises with QuickVend, our vending solutions service.

Accuracy up
cycle times down

Our Panther multi-diameter drills are designed to create multiple bores in one pass whilst reducing cycle times and machining costs, all with highly accurate bore alignment.

These application-specific drills are designed to your requirements and are used for pre-drilling bores, ready for follow-on tools such as machine taps and reamers – for example prior to threading in hydraulic ports, whether two, three or more diameters.

Available in various diameters from 3.00mm to 20.00mm and with flute and overall combinations to suit your feature, such as top chamfer, front counter-bore, single or multiple steps, with a taper, shoulder or radius.

Panther drills are suitable for machining a wide variety of materials including cast iron, steel, stainless steel, aluminium and plastics. We design the tools with relevant geometries, with or without coatings, to suit your specifications.

Highly accurate bores in one pass

Versatility
and cost-effectiveness

GD

Our Lion GTC (through-coolant) and GD (solid) drills have our unique blend of micrograin carbide substrate and superior coatings, providing a recipe that guarantees high performance, cost-effective drilling in a wide range of materials.

Quickgrind's high quality manufacturing processes ensure a high quality surface finish and excellent coating for optimal chip evacuation. High process temperatures are dissipated safely and effectively.

Lion drills can be designed with application-specific helix angle and flute geometries. The flute form geometry, designed especially for long-chipping steels, ensures optimal chip generation characteristics even at low cutting speeds.

The GTC through-coolant version ensures perfect penetration and cutting characteristics when machining long-chipping steels. Cutting forces and temperatures are considerably reduced.

With their precision-ground point geometry and strong rake angle, combined with high wear and low coefficient of friction coating, Lion GTC and GD drills are versatile and effective in numerous applications. Whether you go for the through-coolant or solid variant, these drills deliver incredible performance at depths of 3xD to 10xD.

GTC

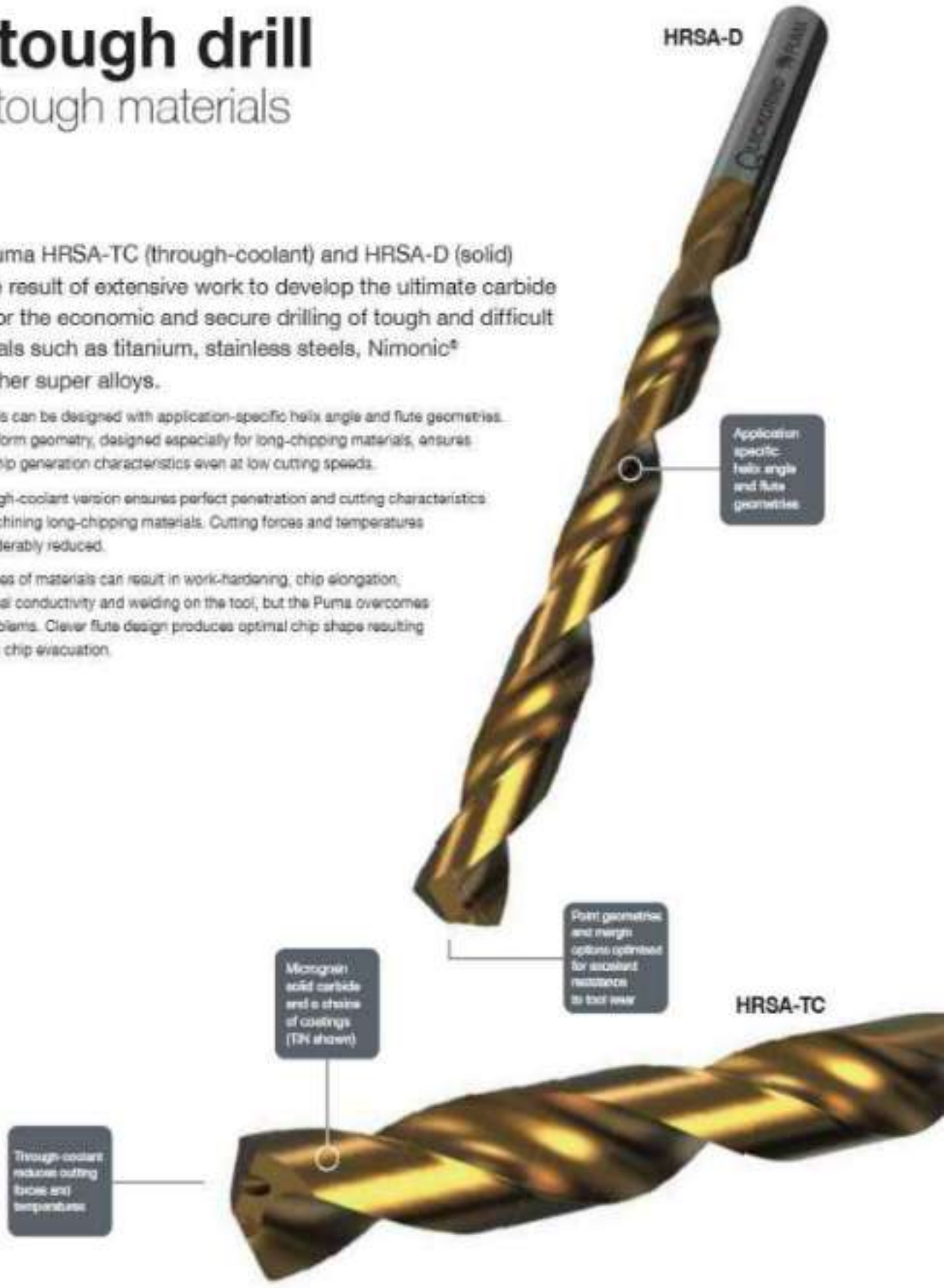
A tough drill
for tough materials

The Puma HRSA-TC (through-coolant) and HRSA-D (solid) are the result of extensive work to develop the ultimate carbide drills for the economic and secure drilling of tough and difficult materials such as titanium, stainless steels, Nimonic® and other super alloys.

Puma drills can be designed with application-specific helix angle and flute geometries. The flute form geometry, designed especially for long-chipping materials, ensures optimal chip generation characteristics even at low cutting speeds.

The through-coolant version ensures perfect penetration and cutting characteristics when machining long-chipping materials. Cutting forces and temperatures are considerably reduced.

These types of materials can result in work-hardening, chip elongation, low thermal conductivity and welding on the tool, but the Puma overcomes these problems. Clever flute design produces optimal chip shape resulting in smooth chip evacuation.



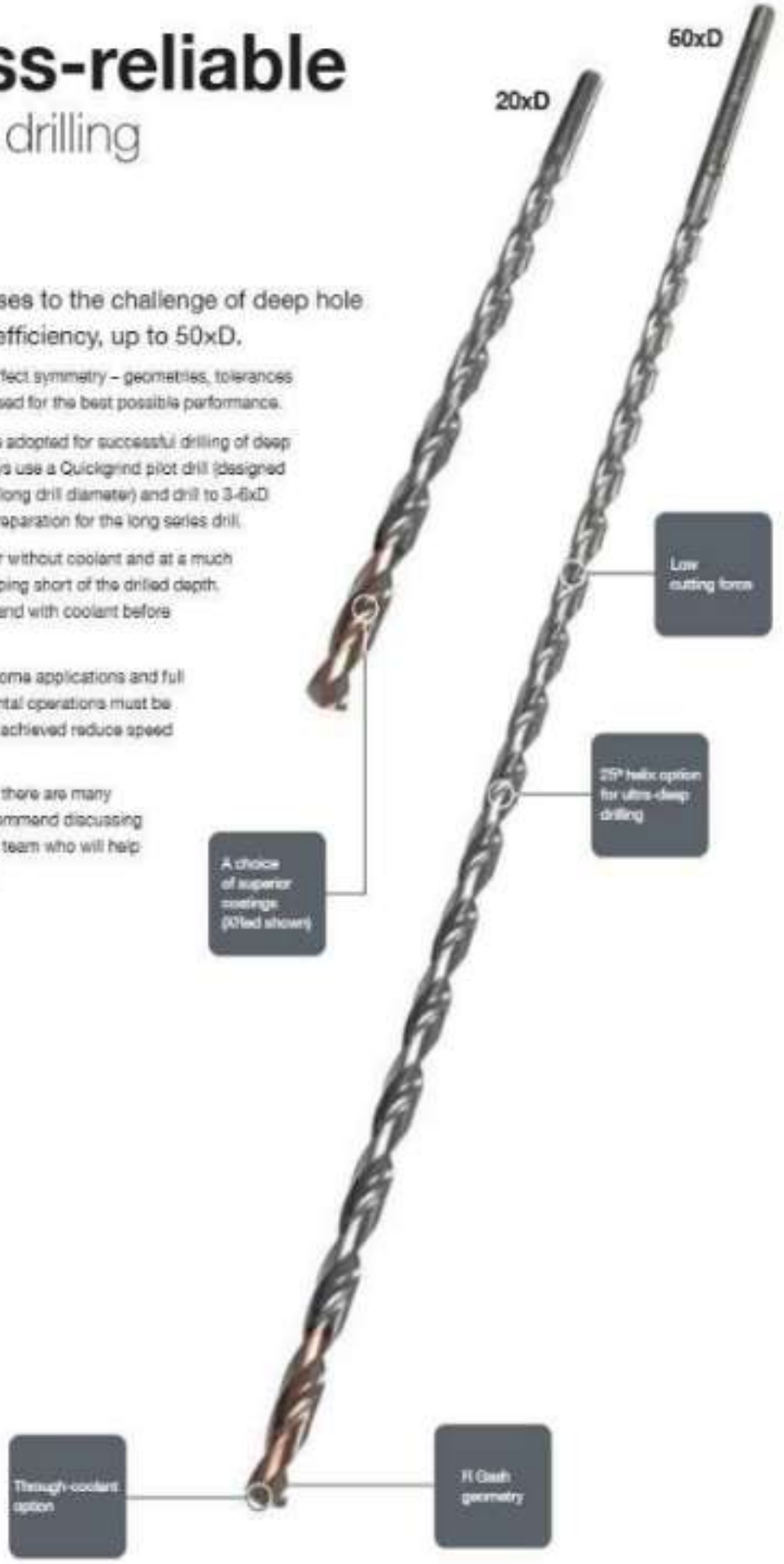
Small
but perfectly formed

Our Lynx Micro and Mini drills are suitable for a wide range of applications in carbon steel, alloy steel, die steel and stainless steel.

PVD coatings, specially formulated for these small diameter drills, result in high durability and long life.

Lynx's recipe of rigid design and strong, tough carbide substrate results in high levels of breakage resistance.

Process-reliable
deep hole drilling



The Leopard DHD rises to the challenge of deep hole drilling with reliable efficiency, up to 50×D.

Each tool is produced with perfect symmetry – geometries, tolerances and point angles are all optimised for the best possible performance.

Correct procedures need to be adopted for successful drilling of deep holes ≥20xD and above. Always use a Quickgrind pilot drill (designed +0.02-0.05mm larger than the long drill diameter) and drill to 3-6xD (depending on drill depth) in preparation for the long series drill.

The follow-on drill should enter without coolant and at a much reduced speed and feed, stopping short of the drilled depth. Run at selected higher speed and with coolant before proceeding.

Pecking is recommended on some applications and full retraction of the drill on horizontal operations must be considered. Once full depth is achieved reduce speed and feed on retraction.

As with all drilling applications there are many variables which is why we recommend discussing your project with our technical team who will help with drill selection and design.

More throughput
lower costs

Jaguar drills are made with the latest submicrograin carbide which, combined with a special coating and self-centring geometry, results in increased productivity and a reduced cost per hole.

The Jaguar is primarily designed for use in steels and tool steels but is versatile enough to work well in other materials. Various coatings are available to aid performance and lengthen tool life. Centre-drilling is not required when boring high quality holes.

High feed
accurate holes

Cougar TF (three flute) drills are used on difficult steels, alloyed steel and non-ferrous materials and are designed for core drilling and opening out existing bores.

The three flutes allow direct penetration of hard, tough steels and other materials without the need of pre-centring.

Cougar drills are capable of achieving a reamer class finish with added support during the cutting process due to the extra flute.

With three flute drills, under the right circumstances, it is possible to achieve up to 50% higher feed rate per revolution.

Straight
to the point

Tiger straight-flute drills are designed for highly productive holemaking in aluminium and cast iron automotive and motorsport components.

Their dedicated substrate and optional coatings withstand the abrasive wear resulting from high speeds and temperatures, typical in aluminium silicon alloys and cast iron machining. This helps extend tool life and improve productivity.

Typical applications are cylinder blocks, cylinder heads, cases, steering knuckles and brake cylinders in aluminium silicon alloys and all grades of cast iron including GCI, CGI and nodular.

These drills are also ideal for pre-tapping hole sizes, chamfer holes, radii and multi-step forms.

Tiger drills support complex, multi-step applications and are custom made to suit your precise component requirements. Features include step angles with chamfer and radii, point angle and up to 8xD capability. All of this adds up to high productivity and long tool life, providing you with a low cost per hole.

Like all our drills, Tiger is designed for multiple remanufactures, guaranteeing you new tool performance again and again.

MX
AlTiN Coating

The coating for **moderate cutting speeds**

MX AlTiN is designed to handle high levels of shear stress and impact fatigue. It can cope with cutting temperatures of up to 850°C.

Crystallite size and internal stress levels are controlled by a selected PVD Arc deposition process.

MX's optimum cutting performance is ensured by its unique composition modulation and stress gradient formula.

Performance is predictable across a wide range of materials including mild steels to tool steels with up to 50 Hrc.

Cutting speeds range from 40 to 350 M/min depending on conditions and work piece material.

The coating can be applied to virtually any of our solid carbide tools and will be offered where applicable.

Technical data

Coating material	AlTiN
Coating thickness	2-4µm
Deposition process	PVD Arc
Hardness HV 0.05	3300
Oxidation temperature	850°C
Coefficient of friction	<0.6
Process temperature	450-500°C
Colour	Blue/black

Cutting speed M/min	40	60	80	100	120	140	160	180	200	220	250	300
Steels up to 700 N/mm²				■	■	■	■	■	■	■	■	
Steels 800-1000 N/mm²			■	■	■	■	■	■	■			
Steels >1400 N/mm²		■	■	■	■	■	■	■				
Tool steels >45-55 Hrc	■	■	■	■	■	■	■					
Tool steels >55-60 Hrc	■	■	■	■	■	■						
Cast iron		■	■	■	■	■	■	■				
Martensitic stainless steels	■	■	■									
Austenitic stainless steels												
Titanium up to 900 N/mm²												
Titanium alloys >900 N/mm²												
Nickel alloys up to 900 N/mm²												
Nickel alloys >1200 N/mm²												

Cutting data is subject to application and machining parameters.
Please contact our Technical Support team for advice.

XRed/XRed SL

TiSiN Coating

The coating for **challenging conditions**

XRed TiSiN is engineered to withstand temperatures of up to 1100°C at the cutting edge, making it perfect for the machining of hard materials at high speeds and with low or no lubrication.

Its multi-layer coating, with crystalline TiN matrix/Si_3N_4 nano crystallite outer layer, is designed to protect the cutting edge from excess wear, oxidation and heat transfer.

XRed is ideal for machining titanium, stainless steels, super alloys and steels up to 60 Hrc. It is very capable in applications such as roughing, trochoidal milling, semi-finishing and finishing where there are high temperatures at the cutting edge.

Quickgrind's high quality grinding and expertise allows for excellent chip formation and evacuation at high speed and feed without fear of damage to the tool or the component.

Our XRed SL coating is the higher-performing version of the standard XRed. Please contact our Technical Support team for advice.

Technical data

Coating material	TiSiN
Coating thickness	2-4µm
Deposition process	PVD Arc
Hardness HV 0.05	3500
Oxidation temperature	1100°C
Coefficient of friction	<0,4
Process temperature	450-550°C
Colour	Copper

Cutting speed M/min	40	60	80	100	120	140	160	180	200	220	250	300
Steels up to 700 N/mm²												
Steels 800-1000 N/mm²												
Steels >1400 N/mm²												
Tool steels >45-55 Hrc												
Tool steels >55-60 Hrc												
Cast iron												
Martensitic stainless steels												
Austenitic stainless steels												
Titanium up to 900 N/mm²												
Titanium alloys >900 N/mm²												
Nickel alloys up to 900 N/mm²												
Nickel alloys >1200 N/mm²												

Cutting data is subject to application and machining parameters.
Please contact our Technical Support team for advice.

TX
ta-C Coating

A smooth
ta-C coating

Our TX range of three advanced coatings (TX-R, TX-G and TX-T) has been developed for the machining of non-ferrous metals, composite structures and plastic materials. With an sp3 content of 60%-70% they reach a hardness of over 5000HV.

These thin, smooth and extremely hard coatings are designed to maintain maximum cutting edge sharpness when machining abrasive materials such as graphite, composite materials with glass or carbon fibre, glass-reinforced PCB materials and high Si content aluminium alloys.

The TX range excels in cutting soft noble metals like gold, silver and copper as well as lead-containing and lead-free bronzes and brass alloys. Their variable thickness, very low coefficient of friction and anti-stick properties makes them excellent for machining a wide range of plastics and sticky materials where they avoid the build-up of material on the sharp cutting edge.

Our TX coatings supersede the conventional DLC coatings and are available on almost all of our solid carbide cutting tools.

Combined with our special grinding knowledge and techniques TX coatings have proven to be a very economical solution for machining difficult materials, reducing the need for expensive PCD inserts and diamond-coated tools.

TX-coated tools are also suitable for remanufacture and recoating thereby bringing even greater savings.

Technical data required

Coating material	ta-C*
Coating thickness	0.5-3µm
Deposition process	PVD Arc
Hardness HV 0.02	>5000
Oxidation temperature	500°C
Coefficient of friction	<0.1
Process temperature	Below 180°C
Adhesion	Very good, typically class 1
Colours	TX-R – rainbow TX-G – dark grey/ black TX-T – dark grey/ black

Tetrahedral amorphous carbon (also known as diamond-like carbon)

Name	Colour	Thickness	Recommended applications
TX-R (rainbow)		<0.5µm	Soft non-ferrous/metal machining (Al, Mg, plastic, rubber, wood laminates)
TX-G (general)		<0.6-1µm	Non-ferrous/metal machining AISi and auto parts, injection moulds & dies
TX-T (thick)		<2-4µm	AlSi >12%, graphite, CFRP, MMC Machining

The multi-purpose
coating solution

Our TiN coating is a multi-purpose solution for low and medium cutting speeds in a wide range of applications.

It is a cost-effective solution designed for tools in a variety of general machining conditions where a high-end coating is not needed.

It is ideal for milling, drilling and turning mild steels at cutting speeds below 100 M/min.

Technical data

Coating material	TiN
Coating thickness	2-4µm
Deposition process	PVD Arc
Hardness HV 0.05	2600
Oxidation temperature	500°C
Coefficient of friction	<0.5
Process temperature	450-550°C
Colour	Gold

Cutting speed M/min	40	60	80	100	120	140	160	180	200	220	250	300
Steels up to 700 N/mm²	■	■	■									
Steels 800-1000 N/mm²	■	■										
Steels >1400 N/mm²	■											
Tool steels >45-55 Hrc												
Tool steels >55-60 Hrc												
Cast iron	■											
Martensitic stainless steels												
Austenitic stainless steels												
Titanium up to 900 N/mm²												
Titanium alloys >900 N/mm²												
Nickel alloys up to 900 N/mm²												
Nickel alloys >1200 N/mm²												

Cutting data is subject to application and machining parameters.
Please contact our Technical Support team for advice.

CXPlus
AlCrN Coating

Smoother, harder, **stronger**

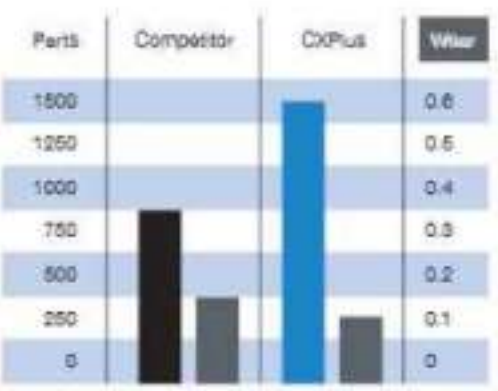
CXPlus's AlCrN advanced arc deposition process deposits coatings at far higher energy levels than conventional processes.

This results in increased density, a higher resistance to wear and a reduction in chipping on cutting edges. Its smooth surface and the controlled coating composition ensures improved tool performance.

CXPlus is suitable for wet and dry machining at medium to high speeds in milling and drilling operations with temperatures reaching up to 1050°C. Its versatility makes it suitable for a wide range of materials including low to high tensile steels, cast irons, tool steels, stainless steels, titanium and nickel alloys.

Technical data

Coating material	AlCrN
Coating thickness	2-4µm
Deposition process	PVD Arc
Microhardness HV 0.02	3200
Friction vs steel (dry)	0.55
Max service temp	1050°C
Process temperature	450-500°C
Colour	Grey



Technical data

Milling formula

Cutting speed (Vc)	Spindle speed (n)	Feed per tooth (Fz)	Table feed (Vf)
$\frac{d \times \pi \times n}{1000}$ (M/min)	$\frac{Vc \times 1000}{\pi \times d}$ (rpm)	$\frac{Vf}{z \times n}$ (mm)	$Fz \times z \times n$ (mm/min)

Vc = cutting speed (m/min); z = number of flutes; Fz = feed per tooth (mm); n = spindle speed (rpm); d = tool diameter (mm); π = 3.142
ap = depth of cut (mm); ae = width of cut

Calculation of average chip thickness

$$hm = Fz \sqrt{\frac{a_e}{d}} \qquad Fz = hm \sqrt{\frac{d}{a_e}}$$

ae max = maximum lateral infeed depending on the material to be machined (mm); Fz = feed per tooth (mm); hm = average chip thickness (mm);
d = tool diameter (mm)

Workpiece materials key

Steels	P1	Low carbon	EN1A, EN8, 1006, 1008, 1015, 1016, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 1215, 133
	P2	Medium carbon, Alloy steels	1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5162, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310
	P3	Die/tool steels	O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A120, D2, D3, D4, D5, D7
Stainless steels	M1	Free machining	430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F
	M2	Austenitic, Martensitic, PH stainless	301, 302, High Tensile, 304, 304L, 305, 316, 420, 15-5PH, 17-4PH, 17-7PH
	M3	Cobalt chrome alloys, Duplex 22%, Super Duplex 25%	302B, 304B, 309, 310, 316b, 316L, 316Ti, 317, 317L, PH13-8Mo, Nitronica
Cast irons	K1	Grey cast iron (GC) <180HB	ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, Grades G1800, G3000, G3500, GG10, 15, 20, 25, 30, 35, 40
	K2	Ductile cast iron	-
	K3	Malleable cast iron (SC) 180-260HB	60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450
Non-ferrous	N1	Aluminium < 10% Si	Aluminium/Aluminium Alloys < 10% Si
	N2	Aluminium > 10% Si	Aluminium/Aluminium Alloys > 10% Si
	N3	Copper/copper alloys, Brass/bronze	Brass, Cu/Cu Alloys/Magnesium
Special alloys	S1	High temp alloys	Nimonica, Inconel 625, 718, 825, Monel, Hastelloy
	S2	Titanium alloys	6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al
Hardened steels	H	Hardened steels (44-65 HRc)	H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, D2, D3, D4, D5, D7

Example ● Primary ◐ Secondary ○ Unsuitable

Cutting speeds by material group

			Feed recommendations				
Tool diameter (mm)			3.00	4.00	6.00	8.00	10.00
		Vc (M/min)	Feed per tooth (mm)				
Steels	P1	180-220	0.013-0.020	0.020-0.030	0.040-0.050	0.040-0.055	0.050-0.060
	P2	160-180	0.010-0.015	0.012-0.018	0.015-0.020	0.018-0.022	0.020-0.026
	P3	90-140	0.008-0.013	0.010-0.015	0.012-0.017	0.015-0.020	0.018-0.022
Stainless steels	M1	70-90	0.013-0.015	0.013-0.018	0.014-0.020	0.020-0.028	0.028-0.038
	M2	55-70	0.010-0.015	0.012-0.016	0.013-0.018	0.018-0.023	0.024-0.034
	M3	40-50	0.008-0.013	0.009-0.015	0.010-0.016	0.015-0.021	0.019-0.029
Cast irons	K1	160-180	0.013-0.020	00.20-0.030	0.040-0.050	0.040-0.055	0.050-0.060
	K2	120-150	0.013-0.020	00.20-0.030	0.040-0.050	0.040-0.055	0.050-0.060
	K3	70-120	0.008-0.013	0.010-0.015	0.018-0.025	0.015-0.020	0.018-0.022
Non-ferrous	N1	300-550	0.028-0.042	0.030-0.044	0.045-0.050	0.050-0.060	0.065-0.072
	N2	200-350	0.025-0.040	0.028-0.042	0.025-0.040	0.045-0.052	0.058-0.068
	N3	120-220	0.020-0.032	0.022-0.035	0.025-0.032	0.030-0.038	0.036-0.046
Special alloys	S1	35-55	0.003-0.005	0.003-0.006	0.005-0.008	0.006-0.009	0.006-0.015
	S2	50-70	0.008-0.010	0.008-0.010	0.010-0.015	0.015-0.020	0.020-0.030
Hardened steels	H	40-50	0.008-0.013	0.008-0.013	0.010-0.015	0.015-0.020	0.020-0.030

Tool diameter (mm)			10.00	12.00	16.00	20.00	-
		Vc (M/min)	Feed per tooth (mm)				
Steels	P1	180-220	0.060-0.070	0.065-0.075	0.070-0.080	0.080-0.090	-
	P2	160-180	0.030-0.035	0.040-0.045	0.050-0.060	0.060-0.070	-
	P3	90-140	0.025-0.030	0.035-0.035	0.040-0.050	0.050-0.060	-
Stainless steels	M1	70-90	0.045-0.055	0.058-0.065	0.075-0.080	0.082-0.090	-
	M2	55-70	0.035-0.047	0.045-0.058	0.060-0.065	0.066-0.075	-
	M3	40-50	0.030-0.041	0.039-0.054	0.054-0.060	0.059-0.065	-
Cast irons	K1	160-180	0.013-0.021	0.020-0.031	0.040-0.060	0.040-0.065	-
	K2	120-150	0.013-0.021	0.020-0.031	0.040-0.060	0.040-0.065	-
	K3	70-120	0.025-0.030	0.025-0.035	0.040-0.050	0.050-0.060	-
Non-ferrous	N1	300-550	0.068-0.076	0.080-0.100	0.100-0.200	0.200-0.300	-
	N2	200-350	0.065-0.072	0.068-0.095	0.080-0.095	0.100-0.200	-
	N3	120-220	0.046-0.051	0.052-0.083	0.068-0.095	0.080-0.100	-
Special alloys	S1	35-55	0.015-0.030	0.020-0.030	0.030-0.040	0.045-0.050	-
	S2	50-70	0.025-0.035	0.030-0.040	0.040-0.045	0.045-0.050	-
Hardened steels	H	40-50	0.025-0.035	0.030-0.040	0.035-0.045	0.040-0.050	-

Note: Cutting data recommendations are guidelines only and are based on ideal cutting conditions.

Cutting data – trochoidal milling

			Feed recommendations					
Tool diameter (mm)			6.00	6.00	8.00	8.00	10.00	10.00
			Ae	Ae	Ae	Ae	Ae	Ae
ap		≤ 0.9 x L2	0.05 x D	0.1 x D	0.05 x D	0.1 x D	0.05 x D	0.1 x D
Steels	P1	Vc	200-300	200-300	200-300	200-300	200-300	200-300
		Fz	0.130	0.090	0.160	0.110	0.200	0.140
	P2	Vc	240-260	240-260	240-260	240-260	240-260	240-260
		Fz	0.110	0.080	0.140	0.100	0.180	0.130
	P3	Vc	200-220	200-220	200-220	200-220	200-220	200-220
		Fz	0.110	0.080	0.140	0.100	0.180	0.130
Stainless steels	M1	Vc	180-200	180-200	180-200	180-200	180-200	180-200
		Fz	0.060	0.060	0.100	0.070	0.130	0.090
	M2	Vc	140-160	140-160	140-160	140-160	140-160	140-160
		Fz	0.060	0.060	0.100	0.070	0.130	0.090
	M3	Vc	120-140	120-140	120-140	120-140	120-140	120-140
		Fz	0.040	0.030	0.050	0.040	0.130	0.090
Cast irons	K1	Vc	250-280	250-280	250-280	250-280	250-280	250-280
		Fz	0.060	0.060	0.090	0.070	0.130	0.100
	K2	Vc	160- 220	160-220	160-220	160-220	160-220	160-220
		Fz	0.060	0.060	0.090	0.070	0.130	0.100
	K3	Vc	90-130	90-130	90-130	90-130	90-130	90-130
		Fz	0.060	0.060	0.090	0.070	0.130	0.100
Special alloys	S1	Vc	50-60	50-60	50-60	50-60	50-60	50-60
		Fz	0.040	0.030	0.050	0.040	0.070	0.050
	S2	Vc	80-110	80-110	80-110	80-110	80-110	80-110
		Fz	0.040	0.030	0.050	0.040	0.070	0.050
Hardened steels	H	Vc	60-90	60-90	60-90	60-90	60-90	60-90
		Fz	0.050	0.040	0.060	0.050	0.090	0.070

Tool diameter (mm)			12.00	12.00	16.00	16.00	20.00	20.00
			Ae	Ae	Ae	Ae	Ae	Ae
ap		≤ 0.9 x L2	0.05 x D	0.1 x D	0.05 x D	0.1 x D	0.05 x D	0.1 x D
Steels	P1	Vc	200-300	200-300	200-300	200-300	200- 300	200-300
		Fz	0.250	0.180	0.290	0.210	0.340	0.240
	P2	Vc	240-260	240-260	240-260	240-260	240-260	240-260
		Fz	0.230	0.160	0.270	0.190	0.290	0.210
	P3	Vc	200-220	200-220	200-220	200-220	200-220	200-220
		Fz	0.230	0.160	0.270	0.190	0.290	0.210
Stainless steels	M1	Vc	180-200	180-200	180-200	180-200	180- 200	180-200
		Fz	0.160	0.110	0.190	0.130	0.270	0.190
	M2	Vc	140-160	140-160	140-160	140-160	140-160	140-160
		Fz	0.160	0.110	0.190	0.130	0.270	0.190
	M3	Vc	120-140	120-140	120-140	120-140	120-140	120-140
		Fz	0.160	0.110	0.190	0.130	0.270	0.190
Cast irons	K1	Vc	250- 280	250-280	250-280	250-280	250-280	250-280
		Fz	0.160	0.140	0.160	0.160	0.240	0.200
	K2	Vc	160-220	160-220	160-220	160-220	160-220	160-220
		Fz	0.160	0.140	0.160	0.160	0.240	0.200
	K3	Vc	90-130	90-130	90-130	90-130	90-130	90-130
		Fz	0.160	0.140	0.160	0.160	0.240	0.200
Special alloys	S1	Vc	50-60	50-60	50-60	50-60	50-60	50-60
		Fz	0.080	0.060	0.117	0.083	0.160	0.120
	S2	Vc	80-110	80-110	80-110	80-110	80-110	80-110
		Fz	0.080	0.060	0.117	0.083	0.160	0.120
Hardened steels	H	Vc	60-90	60-90	60-90	60-90	60-90	60-90
		Fz	0.100	0.080	0.120	0.100	0.160	0.140

Note: Cutting data recommendations are guidelines only and are based on ideal cutting conditions.

Cutting speeds – Spectre and Phantom high feed end mills

		Radial cut a_e 60-75% x D				
Spectre a_p		0.150-0.250	0.250-0.300	0.250-0.400	0.300-0.450	0.400-0.600
Phantom a_p		-	-	-	0.450-0.600	0.500-0.700
Tool diameter (mm)		3.00	4.00	5.00	8.00	8.00
		Vc (M/min)	Feed per tooth (mm)			
Steels	P1	150-200	0.090	0.100	0.150	0.200	0.300
	P2	140-190	0.080	0.090	0.120	0.180	0.250
	P3	120-160	0.060	0.080	0.100	0.100	0.120
Stainless steels	M1	90-130	0.080	0.090	0.100	0.150	0.200
	M2	80-100	0.060	0.070	0.090	0.100	0.120
	M3	60-70	0.040	0.055	0.060	0.070	0.080
Cast irons	K1	120-150	0.090	0.090	0.150	0.200	0.300
	K2	110-130	0.090	0.090	0.150	0.200	0.250
	K3	100-130	0.080	0.080	0.100	0.150	0.120
Special alloys	S1	25-40	0.060	0.070	0.090	0.100	0.120
	S2	50-90	0.040	0.055	0.060	0.070	0.080
Hardened steels	H	80-140	0.040	0.055	0.060	0.070	0.080

		Radial cut a_e 60-75% x D				
Spectre a_p		0.600-0.700	0.600-0.800	0.700-1.000	-	-
Phantom a_p		0.600-0.800	0.700-1.000	0.700-1.100	0.900-1.250	-
Tool diameter (mm)		10.00	12.00	16.00	20.00	-
		Vc (M/min)	Feed per tooth (mm)			
Steels	P1	150-200	0.360	0.450	0.480	0.510	-
	P2	140-190	0.280	0.320	0.360	0.360	-
	P3	120-160	0.180	0.220	0.220	0.240	-
Stainless steels	M1	90-130	0.240	0.280	0.280	0.320	-
	M2	80-100	0.140	0.190	0.220	0.280	-
	M3	60-70	0.090	0.120	0.140	0.180	-
Cast irons	K1	120-150	0.360	0.450	0.480	0.510	-
	K2	110-130	0.280	0.320	0.320	0.360	-
	K3	100-130	0.180	0.220	0.220	0.240	-
Special alloys	S1	25-40	0.140	0.190	0.220	0.280	-
	S2	50-90	0.090	0.120	0.140	0.180	-
Hardened steels	H	80-140	0.090	0.120	0.140	0.180	-

Notes: Cutting data recommendations are guidelines only and are based on ideal cutting conditions. Subject to material group – use lower values for harder materials.

Cutting speeds – Bulldog and Reaper high feed end mills

		Radial cut a_e 60-75% x D					
Bulldog a_p[1]			0.300-0.400	0.400-0.500	0.500-0.700	0.600-0.800	0.700-1.00
Tool diameter (mm)			6.00	8.00	10.00	12.00	16.00
		Vc[2] (M/min)			Feed per tooth (mm)		
Steels	P1	120-250	0.200	0.300	0.360	0.550	0.650
	P2	110-200	0.180	0.250	0.280	0.360	0.400
	P3	90-160	0.060	0.120	0.180	0.250	0.300
Cast irons	K1	120-250	0.200	0.300	0.360	0.550	0.600
	K2	110-200	0.200	0.250	0.280	0.360	0.400
	K3	90-160	0.150	0.120	0.180	0.250	0.300
Hardened steels	H	80-140	0.050	0.090	0.120	0.150	0.190

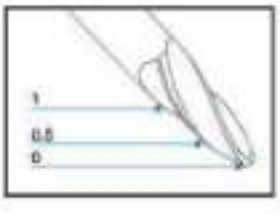
		Radial cut a_e 60-75% x D				
Reaper a_p			0.200-0.350	0.300-0.400	0.350-0.500	0.400-0.650	-
Tool diameter (mm)			6.00	8.00	10.00	12.00	-
		Vc (M/min)			Feed per tooth[3] (mm)		
Steels	P1	160-300	0.125	0.170	0.220	0.280	-
	P2	140-200	0.130	0.170	0.220	0.280	-
	P3	120-160	0.110	0.140	0.160	0.200	-
Hardened steels	H	80-140	0.100	0.140	0.180	0.220	-

Notes: Cutting data recommendations are guidelines only and are based on ideal cutting conditions. Subject to material group – use lower values for harder materials. Bulldog: (1) Reduce a_p for HXL -10% and HXLL -20%; (2) reduce Vc for HXL -20% and HXLL -25%. Reaper Long Series: (3) Reduce Fz -20%.

Cutting data – Eliminator barrel tools

			Feed recommendations				
Tool diameter (mm)			6.00	8.00	10.00	12.00	16.00
		Vc (M/min)			Feed per tooth (mm)		
Steels	P1	170-200	0.030-0.050	0.050-0.070	0.070-0.095	0.100-0.115	0.120-0.155
	P2	140-170	0.030-0.050	0.050-0.070	0.070-0.095	0.100-0.115	0.120-0.155
	P3	90-120	0.010-0.030	0.030-0.050	0.050-0.070	0.070-0.090	0.090-0.135
Stainless steels	M1	110-140	0.030-0.050	0.050-0.070	0.070-0.095	0.100-0.115	0.120-0.155
	M2	60-90	0.030-0.050	0.050-0.070	0.070-0.095	0.100-0.115	0.120-0.155
	M3	40-70	0.025-0.045	0.035-0.060	0.055-0.080	0.090-0.100	0.100-0.120
Cast irons	K1	130-150	0.030-0.050	0.050-0.070	0.070-0.095	0.100-0.115	0.120-0.155
	K2	110-135	0.030-0.050	0.050-0.070	0.070-0.095	0.100-0.115	0.120-0.155
	K3	70-120	0.010-0.030	0.030-0.050	0.050-0.070	0.070-0.090	0.090-0.135
Non-ferrous	N1	250-500	0.045-0.060	0.060-0.075	0.065-0.090	0.085-0.110	0.090-0.120
	N2	150-350	0.045-0.060	0.060-0.075	0.065-0.090	0.085-0.110	0.090-0.120
	N3	130-275	0.035-0.050	0.050-0.065	0.055-0.080	0.080-0.100	0.090-0.115
Special alloys	S1	25-40	0.020-0.030	0.030-0.050	0.050-0.070	0.070-0.100	0.100-0.120
	S2	55-80	0.020-0.030	0.030-0.050	0.050-0.070	0.070-0.100	0.100-0.120
Hardened steels	H	60-90	0.025-0.035	0.035-0.055	0.055-0.075	0.090-0.110	0.120-0.150

Notes: Lower Vc needs to be chosen for the small end diameter and higher Vc on the larger diameters. Data shown is based on the shank diameter.



Barrel tool contact area options

Your CAM system will provide options as to where the barrel tool engages with the workpiece, thereby the effective diameter will change. Some CAM providers call this the 'contact point' and will have in-built functions to enable the cutting data at this point to be compensated for.

There are three possible engagement points (effective diameters) as shown, represented at 1 (largest diameter), 0.5 (middle diameter) and 0 (smallest diameter).

Cutting speeds – ball nose end mills

					Feed recommendations				
Tool diameter (mm)					3.00	4.00	6.00	8.00	10.00
		a_p	a_e	Vc (M/min)	Feed per tooth (mm)				
Steels	P1	0.1 x D	0.5 x D	150-200	0.025	0.025	0.036	0.044	0.060
	P2	0.1 x D	0.5 x D	140-190	0.026	0.026	0.036	0.044	0.060
	P3	0.1 x D	0.5 x D	120-160	0.030	0.030	0.030	0.036	0.050
Stainless steels	M1	0.1 x D	0.5 x D	90-115	0.023	0.030	0.030	0.036	0.050
	M2	0.1 x D	0.5 x D	60-80	0.020	0.024	0.024	0.029	0.040
	M3	0.1 x D	0.5 x D	60-70	0.018	0.020	0.020	0.025	0.034
Cast irons	K1	0.1 x D	0.5 x D	120-150	0.036	0.036	0.036	0.044	0.060
	K2	0.1 x D	0.5 x D	110-130	0.030	0.030	0.030	0.036	0.050
	K3	0.1 x D	0.5 x D	100-130	0.024	0.024	0.024	0.029	0.040
Non-ferrous	N1	0.1 x D	0.5 x D	300-500	0.075	0.090	0.100	0.120	0.150
	N2	0.1 x D	0.5 x D	250-300	0.060	0.070	0.080	0.100	0.125
	N3	0.1 x D	0.5 x D	250-300	0.060	0.070	0.080	0.100	0.125
Special alloys	S1	0.1 x D	0.3 x D	25-40	0.030	0.030	0.030	0.036	0.050
	S2	0.1 x D	0.3 x D	50-90	0.016	0.016	0.016	0.019	0.026
Hardened steels	H	0.1 x D	0.5 x D	80-140	0.027	0.027	0.027	0.033	0.045

					Feed recommendations				
Tool diameter (mm)					10.00	12.00	16.00	20.00	-
		a_p	a_e	Vc (M/min)	Feed per tooth (mm)				
Steels	P1	0.1 x D	0.5 x D	150-200	0.072	0.083	0.101	0.114	-
	P2	0.1 x D	0.5 x D	140-190	0.072	0.083	0.101	0.114	-
	P3	0.1 x D	0.5 x D	120-160	0.061	0.070	0.087	0.101	-
Stainless steels	M1	0.1 x D	0.5 x D	90-115	0.061	0.070	0.087	0.101	-
	M2	0.1 x D	0.5 x D	60-80	0.048	0.056	0.070	0.081	-
	M3	0.1 x D	0.5 x D	60-70	0.040	0.047	0.057	0.065	-
Cast irons	K1	0.1 x D	0.5 x D	120-150	0.072	0.083	0.101	0.114	-
	K2	0.1 x D	0.5 x D	110-130	0.061	0.070	0.087	0.101	-
	K3	0.1 x D	0.5 x D	100-130	0.048	0.056	0.070	0.081	-
Non-ferrous	N1	0.1 x D	0.5 x D	300-500	0.175	0.200	0.250	0.280	-
	N2	0.1 x D	0.5 x D	250-300	0.150	0.175	0.200	0.250	-
	N3	0.1 x D	0.5 x D	250-300	0.150	0.175	0.200	0.250	-
Special alloys	S1	0.1 x D	0.3 x D	25-40	0.061	0.070	0.087	0.101	-
	S2	0.1 x D	0.3 x D	50-90	0.032	0.037	0.046	0.054	-
Hardened steels	H	0.1 x D	0.5 x D	80-140	0.054	0.062	0.077	0.088	-

Note: Cutting data recommendations are guidelines only and are based on ideal cutting conditions

Cutting data – aluminium conventional milling

			Feed recommendations				
Tool diameter (mm)			3.00	4.00	5.00	6.00	8.00
		Vc (M/min)	Feed per tooth (mm)				
Non-ferrous	N1	300-550	0.028-0.042	0.028-0.050	0.050-0.063	0.052-0.065	0.070-0.082
	N2	200-350	0.028-0.042	0.028-0.050	0.050-0.063	0.052-0.065	0.070-0.082
	N3	120-220	0.020-0.032	0.022-0.034	0.025-0.038	0.040-0.058	0.065-0.078

Tool diameter (mm)			10.00	12.00	16.00	20.00	-
		Vc (M/min)	Feed per tooth (mm)				
Non-ferrous	N1	300-550	0.100-0.140	0.120-0.162	0.170-0.182	0.185-0.220	-
	N2	200-350	0.100-0.140	0.120-0.162	0.170-0.182	0.185-0.220	-
	N3	100-220	0.090-0.120	0.100-0.130	0.132-0.150	0.145-0.180	-

Note: Cutting data recommendations are guidelines only and are based on ideal cutting conditions.

Cutting data – trocholdal milling

			Feed recommendations					
Tool diameter (mm)			6.00	6.00	6.00	8.00	8.00	8.00
			a_e	a_e	a_e	a_e	a_e	a_e
a_p		≤ 0.9 x L2	0.05 x D	0.1 x D	0.3 x D	0.05 x D	0.1 x D	0.3 x D
Non-ferrous	N1	Vc	300-500	300-500	300-500	300-500	300-500	300-500
		Fz	0.420	0.310	0.205	0.450	0.350	0.250
	N2	Vc	300-400	300-400	300-400	300-400	300-400	300-400
		Fz	0.350	0.250	0.175	0.380	0.270	0.190
	N3	Vc	250-350	250-350	250-350	250-350	250-350	250-350
		Fz	0.350	0.250	0.175	0.380	0.270	0.190

Tool diameter (mm)			10.00	10.00	10.00	12.00	12.00	12.00
			a_e	a_e	a_e	a_e	a_e	a_e
a_p		≤ 0.9 x L2	0.05 x D	0.1 x D	0.3 x D	0.05 x D	0.1 x D	0.3 x D
Non-ferrous	N1	Vc	300-500	300-500	300-500	300-500	300-500	300-500
		Fz	0.450	0.350	0.250	0.500	0.360	0.250
	N2	Vc	300-400	300-400	300-400	300-400	300- 400	300-400
		Fz	0.400	0.300	0.205	0.430	0.320	0.220
	N3	Vc	250-350	250-350	250-350	250-350	250-350	250-350
		Fz	0.400	0.300	0.205	0.430	0.300	0.230

Tool diameter (mm)			16.00	16.00	16.00	20.00	20.00	20.00
			a_e	a_e	a_e	a_e	a_e	a_e
a_p		≤ 0.9 x L2	0.05 x D	0.1 x D	0.3 x D	0.05 x D	0.1 x D	0.3 x D
Non-ferrous	N1	Vc	300-500	300-500	300-500	300-500	300-500	300-500
		Fz	0.600	0.450	0.310	0.700	0.550	0.380
	N2	Vc	300-400	300-400	300-400	300-400	300-400	300-400
		Fz	0.550	0.400	0.290	0.600	0.450	0.320
	N3	Vc	250-350	250-350	250-350	250-350	250-350	250-350
		Fz	0.570	0.430	0.290	0.600	0.450	0.320

Note: Cutting data recommendations are guidelines only and are based on ideal cutting conditions.

Everything you need **under one roof**

You will have seen from the preceding pages that we have a tool for every situation. The following pages cover our complementary services, all of which are designed to help you get the most out of those tools. We call this Total Solutions Engineering.

QuickCam optimises your machining by creating ideal tool paths. Leveraging our tooling expertise, we enhance application strategies, leading to increased productivity with up to 90% cycle time reduction. We provide remote and on-site support for verification and simulation, harnessing the synergistic benefits of tool development and application strategies under one roof.

QuickLab is our specialised rapid, customised tool design service. With dedicated one-to-one design guidance, we offer over 100 years of extensive experience and knowledge in this field. Our approach follows the best practices in tool design, allowing us to meticulously craft every characteristic of the tool to suit your specific needs.

Our designs incorporate the latest advancements in research and development, ensuring that you benefit from cutting-edge tool design techniques. Additionally, we have low minimum order requirements, making our services accessible to a wide range of clients.

QuickEdge is our remanufacturing service which brings your tools back to an as-new state, providing a cost-effective solution. By opting for remanufactured tools, you can significantly reduce your overall tooling spend while enjoying the benefits of consolidation, as multiple vendor tools can be included in our remanufacturing programme.

We are committed to maximizing your investment by ensuring that your tools are revitalised to their full potential. As part of our dedication to environmental, social and governance (ESG) considerations, remanufacturing also contributes to sustainability efforts.

Remanufactured tools can also offer a quicker turnaround compared to obtaining new tooling, enabling you to resume your operations promptly and efficiently.

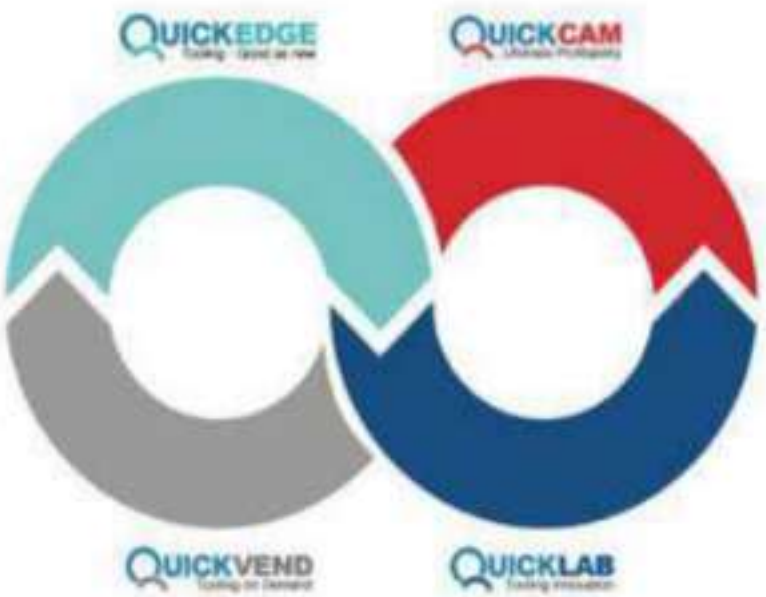
QuickVend is designed to help you increase cash flow and improve financial efficiency.

We achieve this by closely monitoring and strategically reducing your tooling expenditure, streamlining the process of tool purchase administration.

With meticulous tracking of all tooling usage, including details down to the operator, time and day, we ensure comprehensive insights into your operations. Through effective consolidation and inventory management, we work to minimize stock-outs, dead stock and overstock situations, optimising your resources and inventory levels.

We also handle tool transitions seamlessly, ensuring a smooth flow in your operations. By promoting increased usage of remanufactured tooling over new ones, we drive cost savings and sustainability in your tooling practices.

Our flexible "pay as you go" tooling approach further supports your financial goals, allowing you to manage costs efficiently while accessing the tools you need when you need them. Ultimately, this comprehensive service aims to reduce your overall tooling costs and contributes to the financial success of your business.



QUICKCAM
ultimate profitability

Reducing cycle times
and increasing profits

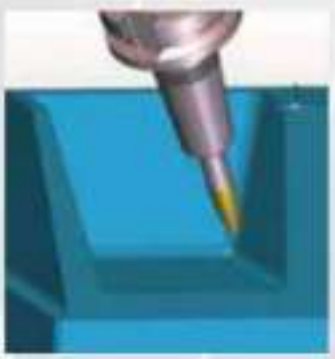
Do you have a component that is taking too long to manufacture? Are you struggling to find the time and resources to investigate advanced machining and cutting tool strategies that could easily double your output? Yes? Then you need to put QuickCam to the test.

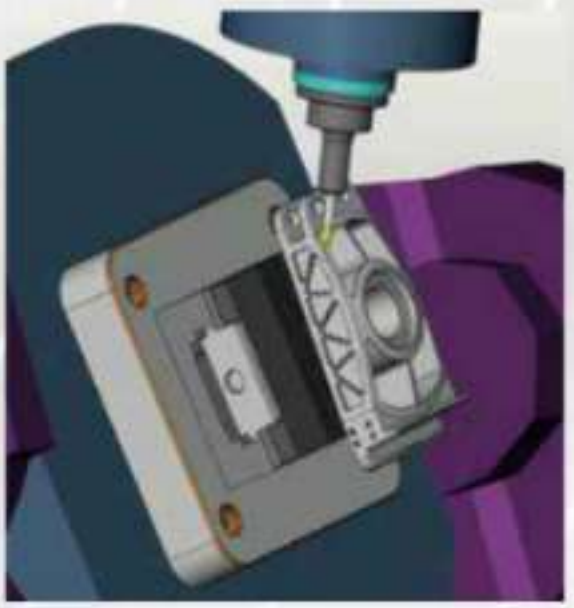
QuickCam is the advanced service from Quickgrind designed to support you with the machining of complex parts in difficult materials.

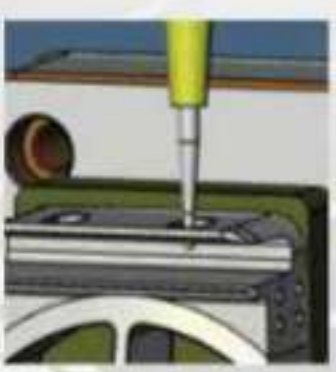
Implementing QuickCam in your business will give you reduced cycle times, leading to reduced tooling costs, increased output and improved capacity.

The bottom line? Improved throughput, more satisfied customers and increased profitability.

CAM programming is essential for maximizing your tooling investment and improving production efficiency. Proper production engineering can eliminate up to 80% of manufacturing waste and unlock the full potential of your cutting tools.







Benefits

- Reduced cycle time costs
- Reduced tooling costs
- Increased output
- Improved capacity
- Increased profits

Tight timescales
No need to programme, organise standard tooling, or free-up valuable machine time

We do the whole package
In-house tool design – no more outsourcing

In-house technology design centre
No more waiting to get on the machines

End-to-end service
Programming and tooling knowledge all under one roof

Your business may not have the in-house expertise and resources to programme their tooling effectively, leading to suboptimal toolpaths and cutting parameters. Leveraging production-programming expertise is the smart solution to address these challenges and optimise production while addressing application issues.

In manufacturing solutions, it's vital to distinguish between two key components: application strategies and production programming. Application strategies optimise machining and create ideal tool paths for each part, while production programming considers the machine, post-processing verification, and precise binary codes for accurate part cutting. Both application and CAM experts play a significant role in achieving optimised results by refining the tool path and ensuring precise execution by the equipment.

Thanks to CAM simulations, the outdated practice of test cuts for various cutting tool paths is largely obsolete. Modern CAM software incorporates simulation capabilities, eliminating the need to run equipment or waste materials during testing. Application experts use dedicated simulators to achieve the highest precision in perfecting the tool path. Using *hyper*MILL® MAXX machining cycles (our in-house CAM), we can offer a very competitive and professional service by ensuring that we always use the most up-to-date machining tool paths. We are an application partner with OPEN MIND and work with many other CAM providers including EdgeCAM, SolidCAM and Siemens NX.

Finding a trusted source of expertise for these procedures can be challenging, as engineering companies may overlook critical factors like machine behaviour and workholding challenges when creating CAM files. Quickgrind provides a comprehensive solution, offering expertise in optimisation, increased productivity, reduced cycle times and on-site support for verification and simulation procedures. Our team possesses intimate knowledge of tool behaviour within the manufacturing context, enabling us to apply best practices and deliver real value and enhanced productivity.

By optimising the processing data through features in CAM software a tool path can be improved by up to 50%. Our programming experts can guide you towards production and tool-cost savings, cycle-time reductions and improved product quality by considering customer perspectives and all factors influencing production efficiency.

Quickgrind's expertise extends beyond cutting tools to optimise every step of your production process, helping you to produce outstanding parts. We offer a holistic view, understanding each step involved, and addressing your unique tooling needs and job requirements for optimal success.

Contact us today to arrange your free initial CAM assessment.

t +44 (0) 1684 294090

e quickcam@quickgrind.com

QUICKLAB
tooling innovation

Best practice design
for the best performing tools

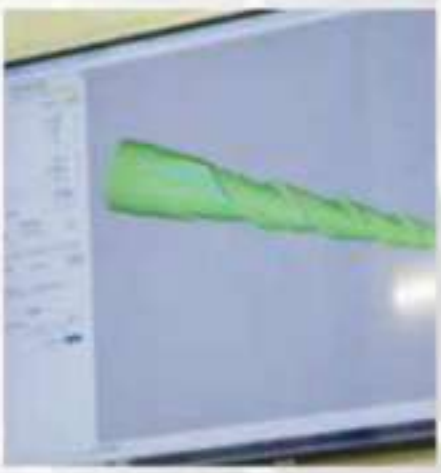
QuickLab allows you to quickly access custom tool designs. With more than 100 years of combined experience and knowledge Quickgrind utilises the best practices in tool design, with complete control over every characteristic of the tool.

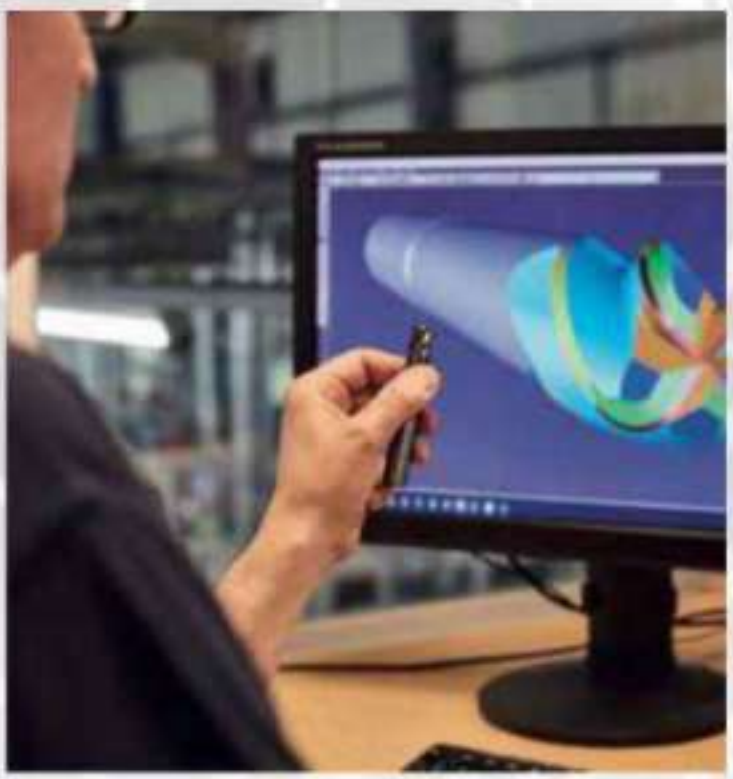
On the one hand a typical business might have to juggle with the limitations of off-the-shelf tooling or accepting long lead-times for bespoke tooling. Large minimum order quantities for 'specials' compounds the problem. The bottom line? Your tooling can be driving the application strategy instead of increasing your efficiency and profitability.

With QuickLab you get rapid turnaround of bespoke tools, often in hours and days not weeks and months.

Adopting the best practices in tool design and with access to the latest advancements in R&D tool design we have control over every aspect of the tool from the ground up.

Finally, enjoy low minimum order requirements. Gone are the days of having to commit to hundreds of tools you don't need.





QUICKVEND
tooling on demand

24/7 control
of your tooling inventory

Compact table top vending machine with 24 locations equipped with a range of our solid carbide tools

Is your tooling inventory reduced to a minimum? Is it secure?
Are your re-stocking orders generated automatically and on time?
Do you want to reduce your tool purchase administration costs?

Quickgrind's robust, proven tool vending solutions are the answer to all these issues and more. Once we have audited your tooling requirements and consumption levels, we will supply you with a fully stocked machine (our machines can hold from 528 to 1,680+ individual tools). Usage and stock levels are then automatically monitored and replacement tools sent before your stock runs out.

And because your tooling inventory and usage levels are pre-determined, you regain complete control of your purchase administration time, and costs – to as little as one purchase order and one invoice per month.

Save time, save money. Take control of your tooling with a vending solution from Quickgrind.

Benefits

- 24/7 secure access
- Allows minimum stock holding
- Automatic re-ordering
- User-friendly operation
- Tailor access to specific users and times
- Easy access to stock information and statistics
- Audit your tooling stock at the push of a button
- Suitable for new and remanufactured tools
- Stocks a wide range of tools types and sizes, and for high or low stock turnover
- Reduces purchase administration costs

QUICKEDGE®
tooling - good as new

Adding value
to your tooling investment

Many of our cutters are suitable for remanufacture. Our unique QuickEdge process can give you up to nine times extra usage out of your tooling, and with material (and environmental) costs increasing, the benefits of remanufacture are clear.

- Tools controlled by size, number of reissues and remanufactures
- Extremely attractive price and performance over the life of the tool
- Reduces the need for virgin raw material, a limited resource

Remanufacture doesn't mean compromising on quality. It has always been our policy to produce tools of such high quality that they can be used more than once. Which means that even after nine remanufactures you will continue to enjoy new tool performance, and a clear conscience.

Ask about our introductory offer today

Quality and speed
Remanufactured to an as-new state and can be quicker than ordering new tooling

Cost and investment
Reduces overall tooling spend and maximises your investment

Consolidate your purchasing
Combine multiple vendor tools into one remanufacturing programme

Environmental, social and corporate governance
Reduce your carbon footprint, enhancing your environmental and corporate credentials

Our service is a far superior form of the regrinding process to an as-new state. Because we have access to our proprietary programmes your remanufactured tool will perform as new, every time, with no compromise. We have seen tools in use for over a decade and many that have been through over 9x remanufacturing cycles.

Properly remanufacturing carbide tools, as opposed to standard regrinds, can greatly enhance the value of your tooling investment. It is crucial that certain techniques for remanufacturing be used to maximize the tool's life and productivity, and a remanufacturing schedule should be developed based on tool life to avoid excessive downtime or catastrophic tool failure.

Of equal importance is the need to recycle and renew. By using our remanufacturing services we can help reduce your carbon footprint enhancing your environmental as well as corporate credentials.

High-performance cutting tools will provide increased efficiency and productivity but they can also be a drain on tooling budgets. Cost-justifying these tools often requires remanufacturing them when they are worn or damaged. A successful reconditioning programme reduces tooling costs by extending life as long as possible.

We can consolidate your requirements, remanufacturing both ours and non-Quickgrind tools, removing the need for you to work with multiple companies. We also remove the hassle out of selecting tools that can and cannot be remanufactured. And you set the parameters on the remanufacturing specifications and we ensure these are maintained – no more having a slightly undersize tool causing a catastrophic issue. The QuickEdge quality processes mean this doesn't happen.

We see a lot of tools every day and have built up a specialised knowledge on wear and tear. Leveraging our Alicona Optima machine we can see in-depth where tools may be deteriorating faster than they should be, if they're failing or, ultimately, if they could be improved to overcome any design limitations.

Finally, because we have been operating internationally for many years, an overseas service is available on quick lead times. With our government AEO accreditations we can expedite shipments both into and out of the UK, therefore reducing the overall lead time.

Don't forget, we happily accept solid carbide cutting tools made by other manufacturers and apply the same expertise to remanufacturing them.

Call us today for more information – +44 (0) 1684 294090.

QUICKGRIND® Technical Centre

Improving
your machining performance

Quickgrind's state-of-the-art Technical Centre offers a comfortable and technologically advanced environment to discuss all of your cutting tool requirements, challenges and ambitions.

Our experts will work with you to conduct trials whilst generating and running tool paths and machining strategies. Our investment in the centre enables us to demonstrate what is possible with our ground-breaking tooling and tool management solutions.

The centre is fully equipped with a seminar theatre and training room, meeting rooms and machining centres. Visitors can take a guided tour of our production facility, undergo technical training and discuss their specific requirements.

Call us today to arrange your visit

Conduct important R&D
Significant investment in state-of-the-art research and training facility

Simulate component cutting
Tailor tooling solutions to optimise productivity and reduce costs

Host industry events
Share best practices, insights and emerging trends

QUEST Education Programme
Training the engineers of tomorrow today

At the heart of Quickgrind's success is a solid commitment to Research and Development. The company has invested significantly in its Technical Centre in order to explore advanced manufacturing techniques and innovative tooling design. Through this continuous pursuit of excellence, we can create tooling solutions that deliver unparalleled precision, efficiency and durability to its clients across various industries.

Understanding the unique challenges faced by clients is crucial to developing effective tooling solutions. Our dedicated team of engineers and experts collaborates closely with clients to simulate their components' production processes. By gaining deep insights into the machining requirements and constraints, we can tailor tooling solutions to optimise productivity, reduce costs and enhance overall manufacturing capabilities.

The Technical Centre is an ideal training venue. We regularly host industry and client events, providing a platform for knowledge exchange and networking. These events bring together industry leaders, manufacturing experts and clients to share best practices, insights and emerging trends. Such engagements foster a collaborative environment, where Quickgrind can understand its clients' evolving needs and, in turn, provide bespoke solutions.

Quickgrind understands the importance of empowering the engineers of the future with knowledge and skills to maximize the potential of its tooling solutions. Our QUEST Education Programme offers comprehensive training workshops, seminars and online resources to educate students on cutting-edge machining techniques, tooling best practices and industry advancements. By empowering young engineers with this knowledge we are ensuring that they can harness the full capabilities of Quickgrind's tooling solutions.

Contact us today about your training requirements or if you need to run your own cutting tool trials.
Call +44 (0) 1684 294090.

Quickgrind Limited | Unit 5701 Shannon Place | Shannon Way
Tewkesbury | Gloucestershire | GL20 8SL | United Kingdom
t +44 (0)1684 294090 | e contact@quickgrind.com | w quickgrind.com
@quickgrind

QUICKGRIND
carbide tooling