The go-to range

Next level standard tooling

Steels and cast irons

Mixed materials

Steels, stainless and exotics

Aluminiums and non-ferrous

Lollipop cutters

Barrel tools

Ball nose cutters

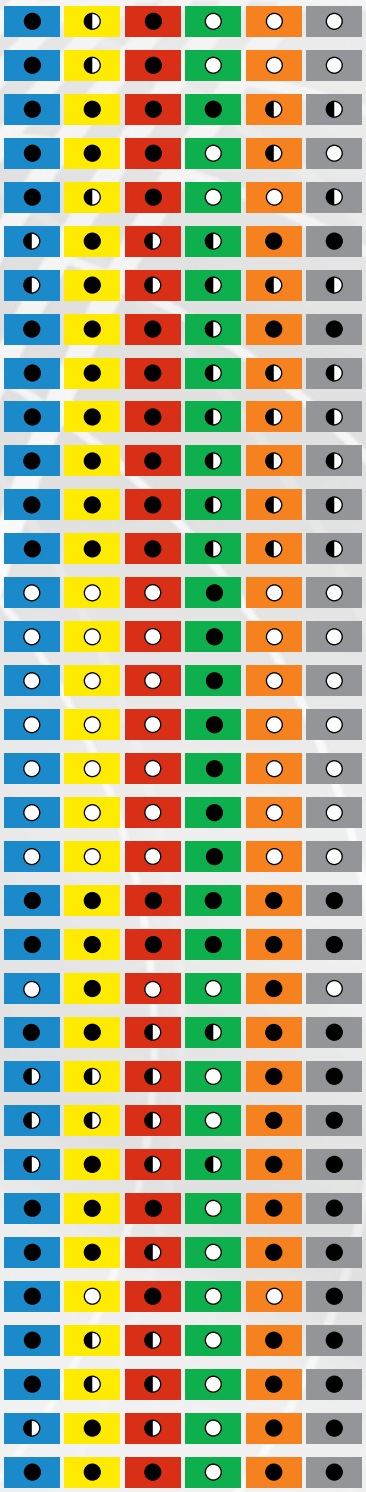
High feed cutters

Multiflute cutters

INFINITE POSSIBILITIES.®

QUICKGRIND® carbide tooling

Contents



● Primary ◐ Secondary ○ Unsuitable

Icons key

- **Standard – available ex-stock**
- **Infinite Possibilities® – customisable**
- **Remanufacture compatible – regrind, recoat, reuse**
- Centre cutting
- Helix angle
- End angle
- VHM
- Coating type
- Variable helix
- Variable index
- Number of teeth
- Ball nose
- Coated ball nose
- Coated chamfer
- Coated corner radius
- Chip breaker
- Step down
- Orbis 270°
- Through-coolant
- Chamfer milling
- Slot milling
- Side finishing
- Side roughing
- Profile milling
- Ramping
- Trochoidal milling
- Plunge milling
- Pocket milling
- Helical milling
- 3D milling

Fifty years **in the making**

Quickgrind is renowned for its bespoke, non-standard solid carbide tooling. Our mission is to provide you with solution-based tooling, to give you the right tool, for the right job, at the right price.

That's why most of our cutters can be designed specifically for your application – size, diameter, neck relief, coating and number of flutes can all be tailored to your needs. Through-coolant and other options are also available. This Infinite Possibilities® ethos means our range of tooling is, well, infinite. You can find an introduction to the Infinite Possibilities® process on the back page. You can also check to see which of our standard tools can be adapted to suit your specific requirements…

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

But you may not know that we also have an ever-expanding range of standard tooling, go-to cutters designed to meet the needs of a wide range of day-to-day applications across all material groups and industry sectors. This brochure is your introduction to that range.

Our standard tools are available ex-stock

All of our standard tools are available ex-stock to keep your machines running and your customers happy. To help your bottom line even further, most have been designed to take advantage of our QuickEdge remanufacture process (re-grind, re-coat, re-use) which gives you up to 9 times extra usage out of your tools. Turn to page 51 to learn more.

Other compatible services include CAM consultancy and tool management. You are welcome to visit our state-of-the-art Technical Centre, a purpose-built space where you can discover all of these services and more – see pages 50 to 53 to find out more.

Whether it's Infinite Possibilities® or our 30 standard ranges with almost 500 tools to choose from, it's time to take a fresh look at Quickgrind. Standard or non-standard, we've got you covered.

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

Online shop

24/7 purchasing
when and where you need

Check out our website complete with ecommerce facility for the convenience of tool purchasing any time, anywhere.

- **Ease of comparison:** You can easily compare prices, features and information on products across different ranges, helping you to make informed purchasing decisions. All of our current brochures are also available online.
- **Convenient payment options:** Our website offers various payment options including credit and debit cards, digital wallets and online payment gateways and, on approval, trade credit, providing you with flexibility, choice and convenience.
- **Efficient order management:** Streamline your order processing and fulfilment, reducing the time and resources required to manage your inventory and shipments.
- **24/7 accessibility:** Allows you to browse and shop at any time of the day or night, increasing convenience and accessibility.
- **Mobile enabled:** Accessible on mobile phone, tablet and computer, whatever your preference.
- **Areas covered:** Our ecommerce facility is currently available to all our UK customers with plans to expand internationally.
- **Convenience:** You can shop from wherever you want without the hassle of emails and telephone calls.
- **Promotions:** Be the first to hear about new products, promotions and offers.
- **Custom tooling quote:** Can't find what you need? Simply complete the online form to receive a custom tooling quote.

Be smart, buy smart. Visit quickgrind.com now and click on the Shop link.

Mobile app

Knowledge
is power

It's never been easier to tap into Quickgrind's 50+ years of tooling expertise and gain a competitive advantage in the fast moving world of machining.

By downloading the Quickgrind app you can enjoy…

- **Milling and drilling information at your fingertips**
- **Tool selection - the best tool for the job; find out more about our ranges**
- **Tool feed and speed calculator**
- **Ability to order standard range tooling direct from the app**
- **Easy access to videos**
- **Continual improvements to keep you ahead of the competition**

Get the knowledge. Download the Quickgrind app today.

Download on the App Store

GET IT ON Google Play

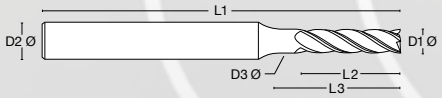
Extended reach
reduced costs

Tool shown 497100

Unique recipe of base material and geometry

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

MX coating for excellent wear resistance

Neck relieved to overcome reach issues

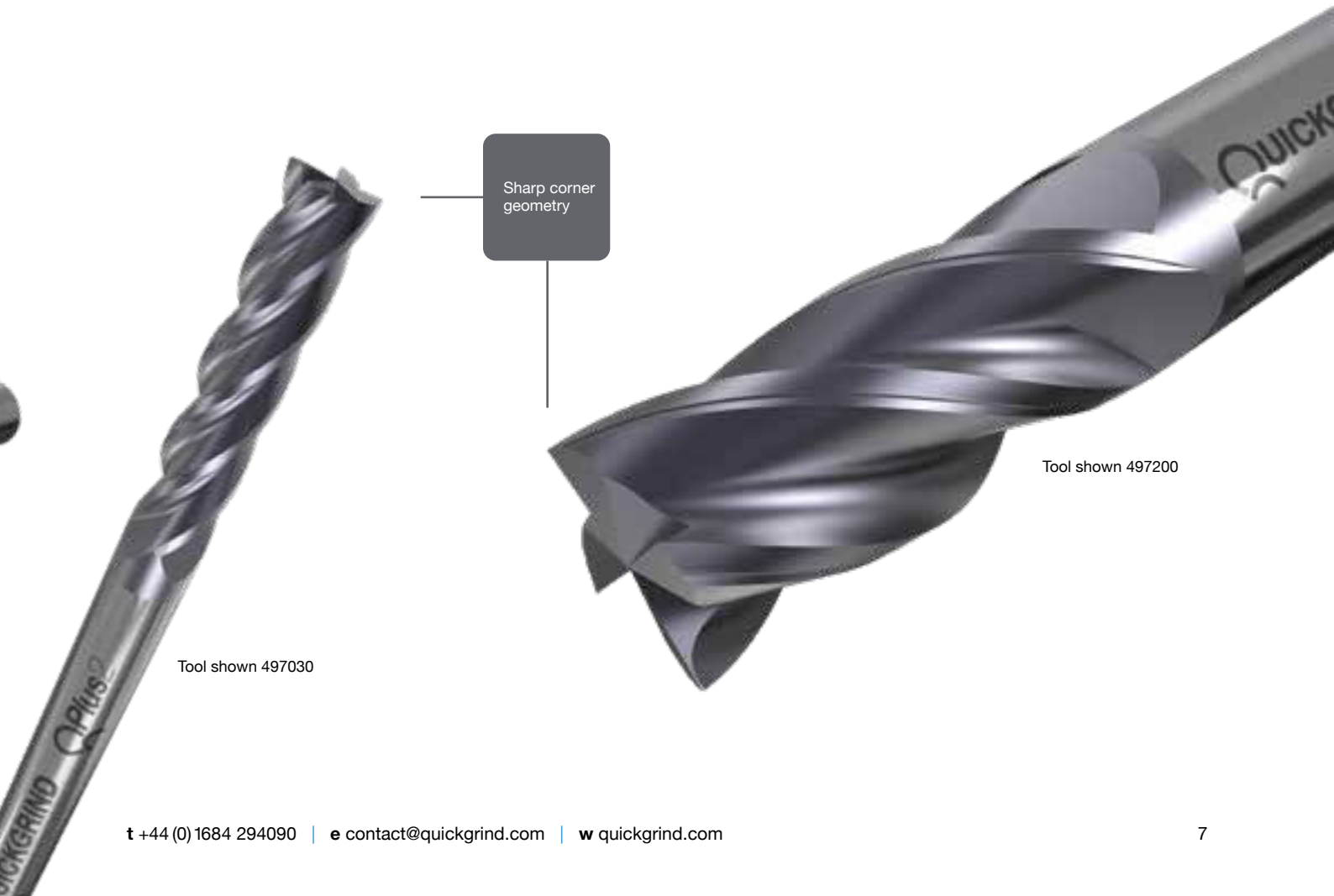
Tool shown 497010

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

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

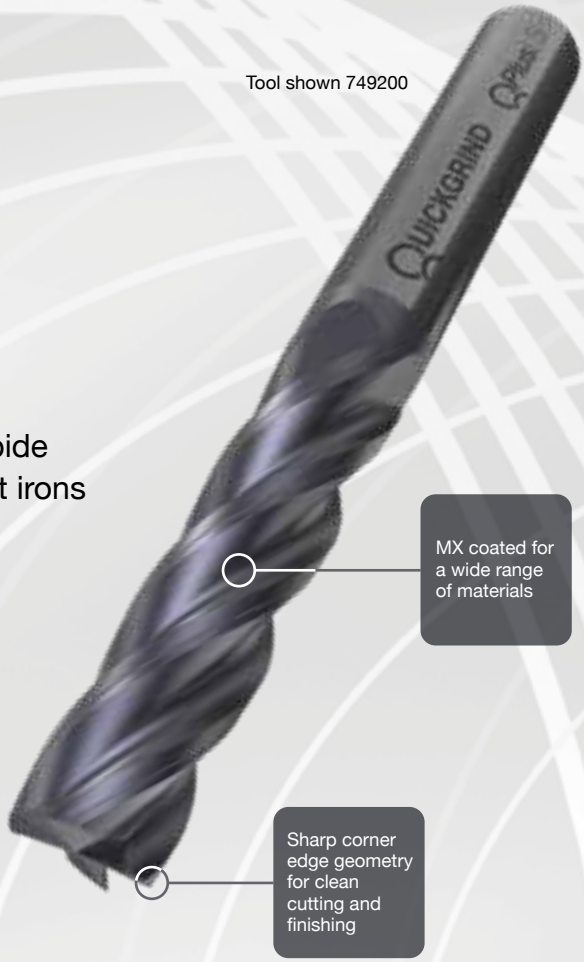
D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Teeth Z	Stock code
1.00	3.00	0.95	39.00	3.00	8.00	4	497010
1.50	3.00	1.45	39.00	6.00	11.00	4	497015
2.00	3.00	1.95	39.00	9.00	15.00	4	497020
2.50	3.00	2.45	39.00	12.00	18.00	4	497025
3.00	3.00	-	39.00	12.00	-	4	497030
3.50	6.00	3.45	58.00	12.00	20.00	4	497035
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 pages 60 and 61 for cutting data



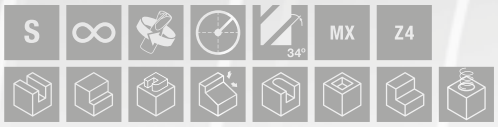
Long Series
for improved access

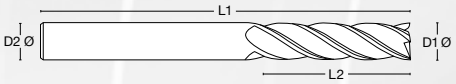
Tool shown 749200



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

See pages 60 and 61 for cutting data

Tool shown 749030

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

Tool shown 189080

Chamfer and more
in all materials

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

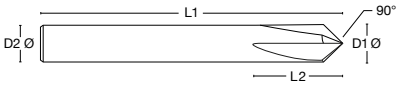
Our Infinite Possibilities® programme means we can adapt this tool to suit your operation. Consider QChamfer for deburring the component while still on the machine to reduce manual deburring.

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.

Tool shown 189040

90° inclusive point angle

S CXPlus Z4



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 60 for cutting data

QBall
High Performance Ball Nose End Mills

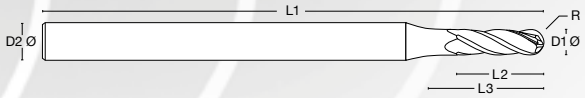
Unique geometry
for most applications

- 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 >500Hv

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



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 64 for cutting data

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

QCut
High Performance End Mills

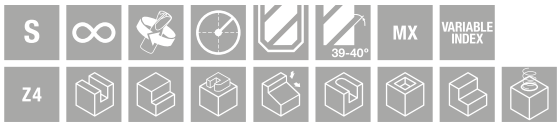
High MRR
with longer tool life

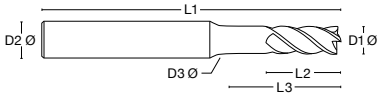
- Latest MX PVD coating developed specifically for aggressive machining conditions in steels and cast iron
- Maintains sharp edges and is also suitable for remanufacture and recoating
- HV hardness 3300, 2-4µ thickness, <0.6 coefficient of friction PVD AlTiN and micro hardness of >500Hv

Tool shown 801200

QCut is a high performance end mill designed for the machining of steels, cast iron and in some instances free machining stainless steel.

QCut delivers high material removal due to its design recipe and superior MX coating, and has excellent stability and free, smooth, chip evacuation. It is suitable for HSM, slotting, roughing, finishing, trochoidal milling, profiling in mould and die, aerospace and other applications.



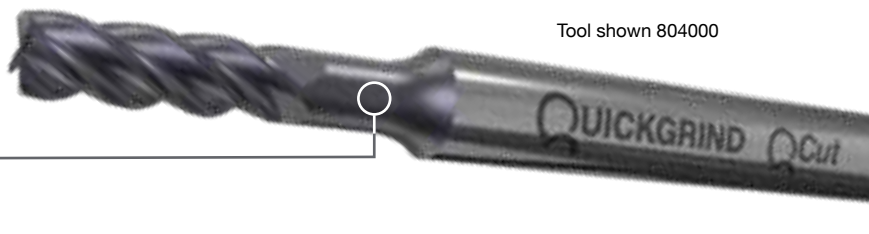


QCut 4 flute variable end mill for steels

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	2.80	58.00	11.00	16.00	0.15	4	803000
4.00	6.00	3.80	58.00	11.00	18.00	0.15	4	804000
5.00	6.00	4.80	58.00	13.00	18.00	0.25	4	805000
6.00	6.00	-	58.00	13.00	-	0.25	4	806000
8.00	8.00	-	64.00	19.00	-	0.25	4	808000
10.00	10.00	-	73.00	22.00	-	0.25	4	801000
12.00	12.00	-	84.00	26.00	-	0.25	4	801200
16.00	16.00	-	93.00	32.00	-	0.35	4	801600
20.00	20.00	-	105.00	38.00	-	0.35	4	802000

See pages 60 and 61 for cutting data

Tool shown 804000



Neck relieved to overcome reach issues

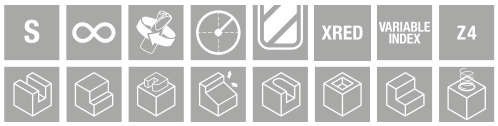
A cut above
the rest

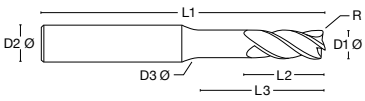
Tool shown 195615

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 (a_e) of anything from ≤ 5% to ≥15% in super alloys/stainless steel depending on the CAM software and machine parameters.

Contact our technical team for assistance – please call +44 (0) 1684 294090 or email contact@quickgrind.com





Tool shown 195609

Tool shown 195614

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

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	13.00	-	-	4	195614
6.00	6.00	-	58.00	13.00	-	0.25	4	195615
6.00	6.00	-	58.00	13.00	-	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 60 and 61 for cutting data

Tool shown 195652

Three flutes
can be better than four

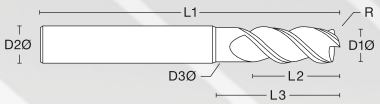
Tool shown 395636

Certain applications benefit from a high performance end mill that has three flutes. Often normally only available in a general design and for non-ferrous materials from other manufacturers, our Delta range fits the bill when machining stainless.

A very capable tool, Delta is designed to work in a wide range of component materials. The additional feature of extended reach increases the versatility of the tool. It is ideal for aggressive slotting, pocketing and ramping due to increased chip clearance and reduced harmonics.

When considering which tool to use, understanding the pros and cons of the number of flutes should be taken into consideration. The higher number of flutes generally allows a higher feed rate per tooth, but a high flute count means a larger core and smaller flute depth.

For example a three flute tool has a smaller core and larger flute space than an eight flute tool, providing more room for the chips to be ejected. Operations such as slotting and horizontal milling on driven tooling benefit from this tool.



Delta 3 flute end mill for general purpose

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	0.25	3	395606
4.00	6.00	3.80	58.00	12.00	20.00	0.25	3	395609
5.00	6.00	4.75	58.00	14.00	22.00	0.25	3	395612
6.00	6.00	5.75	58.00	15.00	24.00	0.25	3	395614
8.00	8.00	7.50	64.00	18.00	26.00	0.50	3	395621
10.00	10.00	9.50	73.00	22.00	30.00	0.50	3	395629
12.00	12.00	11.50	84.00	32.00	40.00	0.50	3	395636
16.00	16.00	15.50	93.00	32.00	50.00	0.50	3	395645

See pages 60 and 61 for cutting data

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

A quantum leap
in MRR and tool life

Tool shown 681060

CXPlus coating for wet and dry machining at medium to high speeds

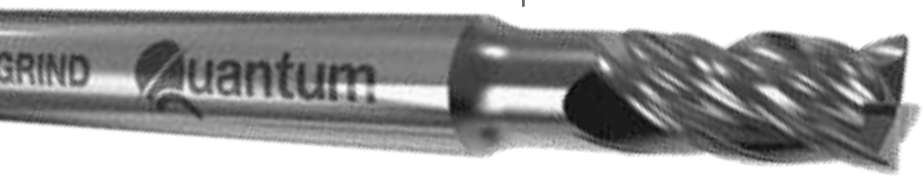
Quantum is a HPC solid carbide end mill designed for a wide range of applications in all materials.

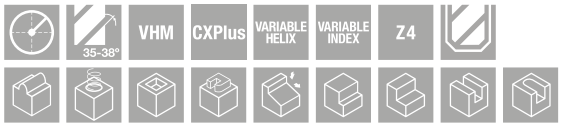
It can be used for both conventional machining or more modern machining methods such as dynamic or trochoidal milling.

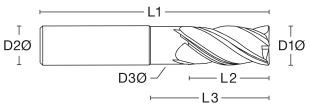
With the aid of modern CAD/CAM software Quantum will perform under all types of cutting conditions. Its unique carbide recipe makes it the go-to tool for all types of machine shop, while Quickgrind's new coating technology is delivering hugely improved results in both MRR and tool life.

Neck relieved to overcome reach issues

Tool shown 681050







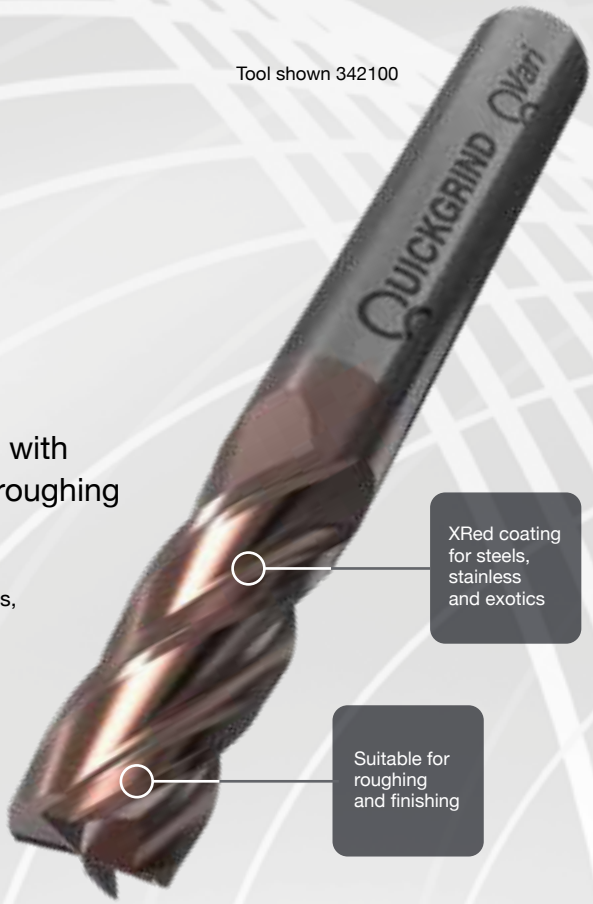
Quantum 4 flute general purpose end mill

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Chamfer mm	Teeth Z	Stock code
3.00	6.00	2.80	58.00	6.50	9.00	0.10	4	681030
4.00	6.00	3.80	58.00	8.00	12.00	0.10	4	681040
5.00	6.00	4.80	58.00	10.50	15.00	0.10	4	681050
6.00	6.00	5.80	58.00	13.00	18.00	0.10	4	681060
8.00	8.00	7.70	64.00	17.00	24.00	0.20	4	681080
10.00	10.00	9.70	73.00	21.00	30.00	0.20	4	681100
12.00	12.00	11.60	85.00	25.00	36.00	0.30	4	681120
16.00	16.00	15.50	93.00	33.00	48.00	0.30	4	681160
20.00	20.00	19.50	105.00	42.00	60.00	0.30	4	681200

See pages 60 and 61 for cutting data

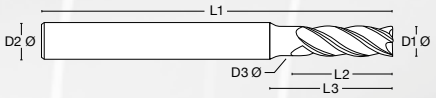
Two tools
in one

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 60 and 61 for cutting data

Tool shown 342040

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

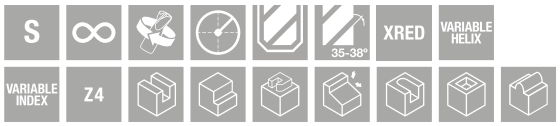
Tool shown 272200

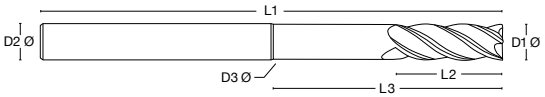
Variable helix and index
with extended reach

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 60 and 61 for cutting data

QVari-CR
High Performance End Mills

Conventional
and trochoidal milling

- Latest XRed PVD coating developed specifically for hard materials at high speeds
- Suitable for remanufacture and recoating
- HV hardness 3500, 2-4µ thickness, <0.4 coefficient of friction PVD TiSiN and oxidisation temperature of 1100°C

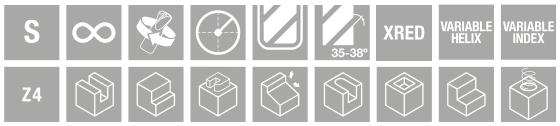
Tool shown 670209

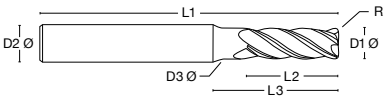
Variable corner radius

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 aerospace industry, or other applications when there is a corner radius requirement.

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	Teeth 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

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

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 60 and 61 for cutting data

High feed rates
with reduced vibration

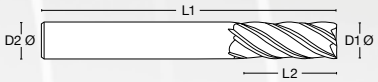
Tool shown 172200

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.

Square corner shown – QVari-5CR features corner radii (see table below)

Tool shown 172100



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

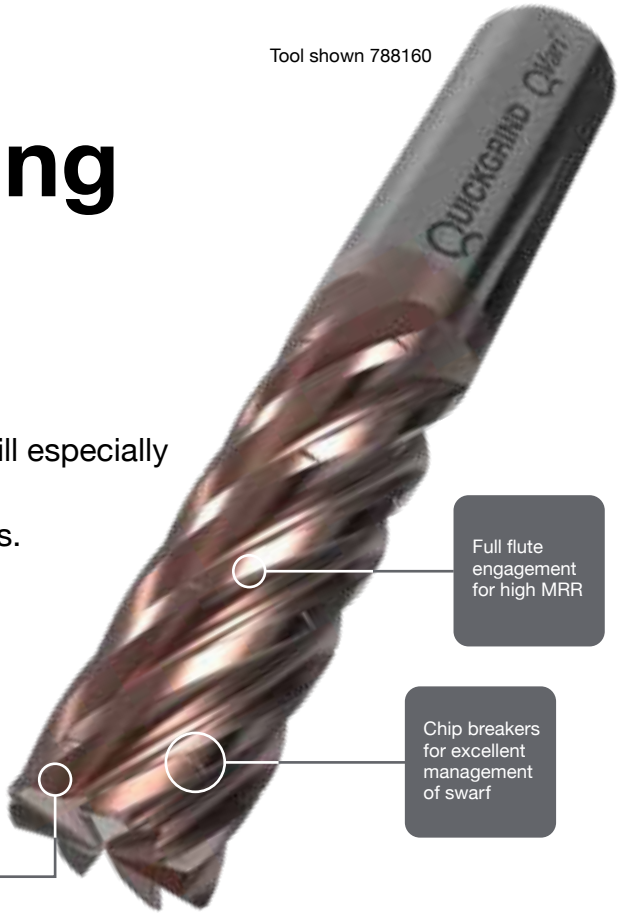
D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	Chamfer x 45°	R mm	Teeth Z	Stock code
6.00	6.00	58.00	13.00	0.08	-	5	172060
6.00	6.00	58.00	13.00	-	0.50	5	172061
6.00	6.00	58.00	13.00	-	1.00	5	172062
8.00	8.00	64.00	20.00	0.10	-	5	172080
8.00	8.00	64.00	20.00	-	0.50	5	172081
8.00	8.00	64.00	20.00	-	1.00	5	172082
10.00	10.00	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 60 and 61 for cutting data

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

Trochoidal milling
with high MRR

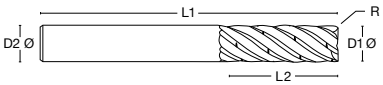
Tool shown 788160



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 60 and 61 for cutting data

Tool shown 788080

ALLIGATOR DUO
High Performance End Mills

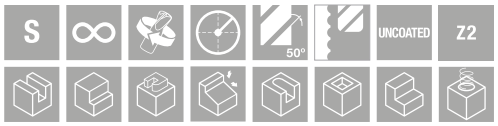
High feed
with excellent finish

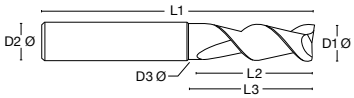
The Alligator Duo 2 flute end mill is designed for machining a wide range of non-ferrous materials such as aluminium alloys.

A well-proven, tried and tested design it has been used for many years on a huge range of components from aerospace and motorsport to mould and die parts.

The flute design and end geometry allow for high speed and feed rates with excellent chip clearance and high material removal rates.

Alligator Duo is especially suitable for roughing strategies and with its sharp corner geometry and no corner breaks is very useful when machining square corners in manufactured parts.





Alligator Duo 2 flute end mill for 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	12.00	20.00	Yes	2	198405
4.00	6.00	3.80	58.00	12.00	20.00	Yes	2	198408
5.00	6.00	4.80	58.00	18.00	24.00	Yes	2	198411
6.00	6.00	5.80	58.00	18.00	30.00	Yes	2	198414
8.00	8.00	7.80	64.00	18.00	30.00	Yes	2	198474
10.00	10.00	9.80	73.00	22.00	35.00	Yes	2	198480
12.00	12.00	11.80	84.00	26.00	45.00	Yes	2	198477
16.00	16.00	15.80	93.00	32.00	50.00	Yes	2	198486
20.00	20.00	19.80	105.00	38.00	55.00	Yes	2	198484

See page 65 for cutting data

Tool shown 198474

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

ALLIGATOR DUO Ball Nose
High Performance Ball nose End Mills

The ball nose **with bite**

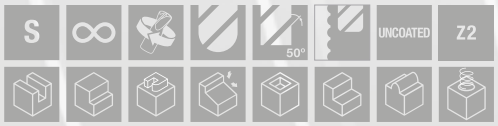
Tool shown 298480

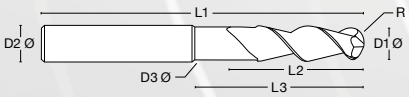
Neck relieved to overcome reach issues

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.

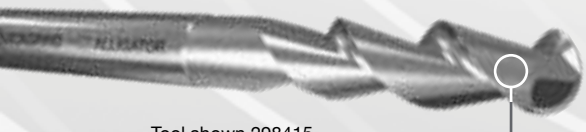




Alligator Duo 2 flute ball nose for aluminium

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	73.00	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

See page 65 for cutting data



Tool shown 298415

Uncoated for most applications

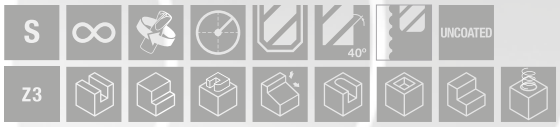
Performance enhanced
with high material removal rates

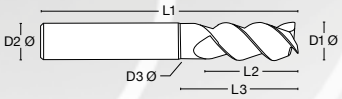
Tool shown 398429

Superior primary relief grinding

The Alligator Trio 3 flute end mill is ideal for high productivity machining of aluminium and other non-ferrous materials. Superior grinding techniques provide high material removal rates and excellent chip evacuation.

It is suitable for HSM, slotting, roughing, finishing, trochoidal milling, profiling in mould and die, aerospace and other applications.





Alligator Trio 3 flute end mill for aluminium

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	2.80	58.00	8.00	16.00	0.05	3	398405
4.00	6.00	3.80	58.00	11.00	18.00	0.06	3	398408
5.00	6.00	4.70	58.00	13.00	20.00	0.06	3	398411
6.00	6.00	5.60	58.00	13.00	20.00	0.08	3	398414
8.00	8.00	7.50	64.00	19.00	25.00	0.10	3	398421
10.00	10.00	9.50	73.00	22.00	30.00	0.15	3	398429
12.00	12.00	11.50	84.00	26.00	36.00	0.15	3	398435
16.00	16.00	15.50	93.00	32.00	42.00	0.20	3	398444
20.00	20.00	19.50	105.00	38.00	50.00	0.25	3	398452

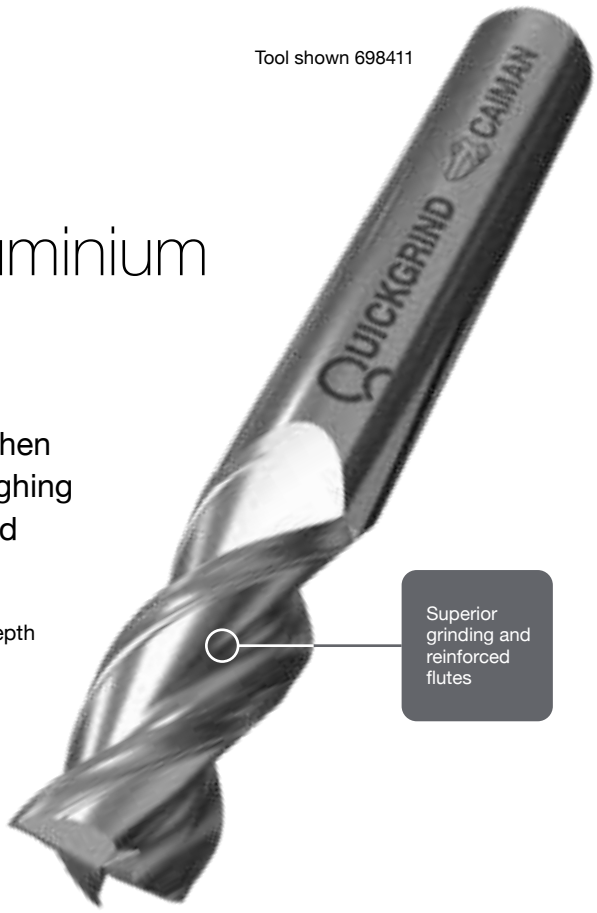
See page 65 for cutting data

Tool shown 398411

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

The choice
for 6000/7000 series aluminium

Tool shown 698411



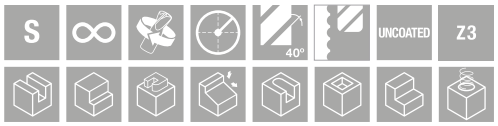
Superior grinding and reinforced flutes

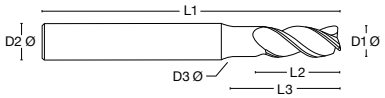
The Caiman is fast becoming the preferred tool when machining 6000 and 7000 series aluminium. Roughing and finishing applications at high speeds and feed rates are where this tool really performs.

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.

Optimised flute design for maximum chip space and swarf evacuation

Tool shown 698405





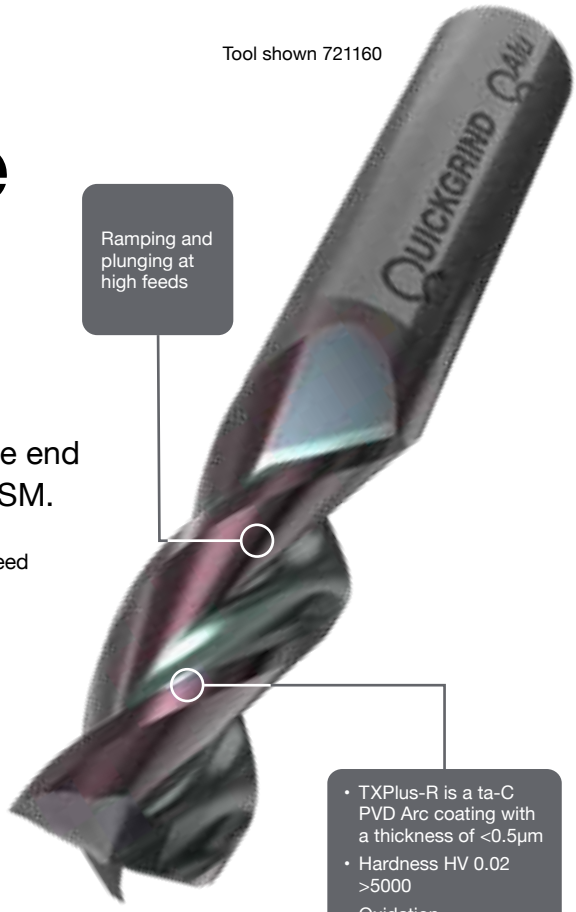
Caiman 3 flute end mill for 6000/7000 series aluminium

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	3.80	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 65 for cutting data

Balanced 3 flute
for high speed milling

Tool shown 721160



Ramping and plunging at high feeds

Sharp corner edge geometry for clean cutting and finishing

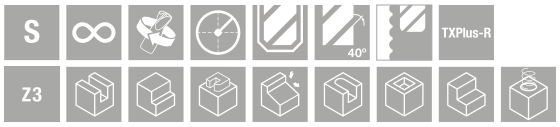
- TXPlus-R is a ta-C PVD Arc coating with a thickness of <0.5µm
- Hardness HV 0.02 >5000
- Oxidation temperature 500°C
- Coefficient of friction <0.1
- Process temperature below 300°C
- Very good, typically class 1 adhesion

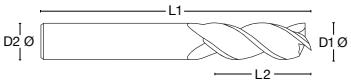
The QAlu is a high performance 3 flute solid carbide end mill designed with 3 teeth to centre for balanced HSM.

Open gullets within the geometry allow for ramping and plunging at higher feed rates while the TXPlus-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, and the corner radius makes it suitable for aerospace projects.

Tool shown 721030





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 65 for cutting data

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

Trochoidal roughing
of aluminium

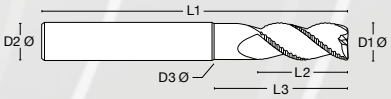
Tool shown 942120

Variable index and helix with TXPlus-R coating

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 TXPlus-R coating.

Tool shown 942060



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

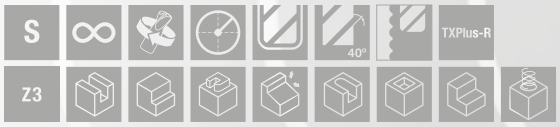
D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	Chamfer x 45°	Teeth Z	Stock code
6.00	6.00	5.70	58.00	13.00	23.00	0.10	3	942060
8.00	8.00	7.70	64.00	18.00	28.00	0.20	3	942080
10.00	10.00	9.50	73.00	21.00	31.00	0.25	3	942100
12.00	12.00	11.50	84.00	25.00	35.00	0.30	3	942120
16.00	16.00	15.30	93.00	32.00	50.00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

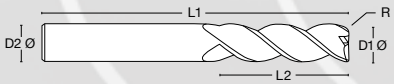
See page 65 for cutting data

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 TXPlus-R coating enhances tool life and achieves excellent surface finishes.

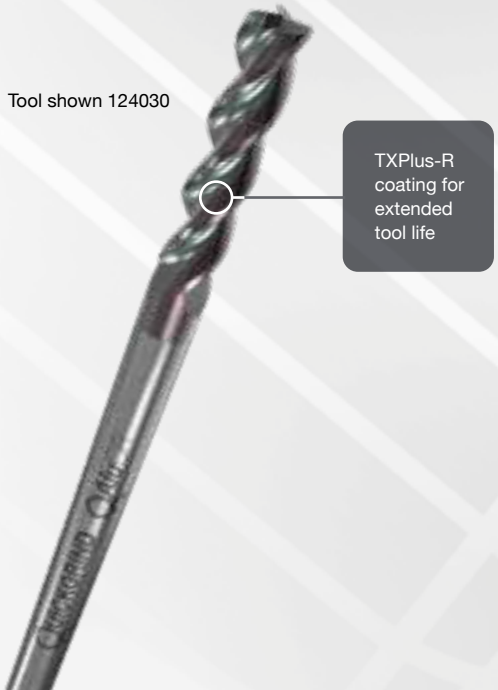
Tool shown 124121





Tool shown 124204

Tool shown 124030



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	124030
3.00	3.00	50.00	12.00	0.50	3	124031
3.00	3.00	50.00	12.00	0.75	3	124032
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

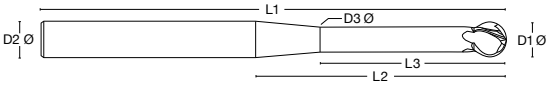
See page 65 for cutting data

Tool shown 866083

A new standard
for complex components

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

Applications and features

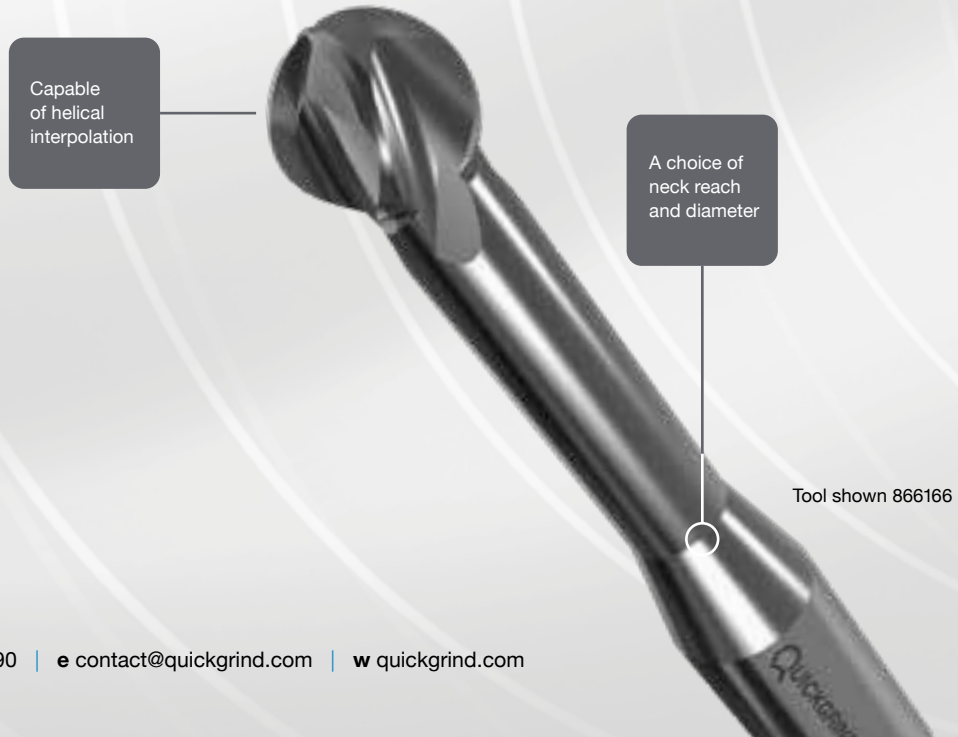
- Spherical cutting in all directions
- Options of neck reach and diameter
- High speed cutting
- Machine manifolds and ports
- Helical interpolation
- Milling of complex thin walled components
- Machining contour shapes
- CXPlus coating for long life and the optimum cutting edge

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

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	1.30	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

See page 59 for cutting data



ELIMINATOR
Conical Barrel Tools

Two tools
in one

Reduces cycle times by up to 90%

Tool shown 307208

Our Eliminator conical barrel tools are revolutionising finishing and semi-finishing strategies on a wide range of components from motor racing to mould and die, and aerospace to medical, including turbine blades and blisks.

Highly efficient at finishing and semi-finishing the 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 420/5120

Cast iron K

- Grey cast iron
- SG iron

Hardened materials H

- Hardened steels 45-55Hrc

Type S | XRed coated

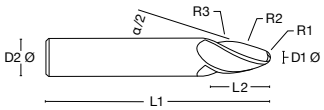
Stainless M

- 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 Ti5Al-5V-5Mo

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



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	250.00	2.00	3	20.00	A	852503
2.00	6.00	58.00	8.50	1.00	250.00	2.00	3	20.00	D	862503
2.00	6.00	58.00	8.50	1.00	250.00	2.00	3	20.00	S	872503
3.00	8.00	64.00	10.50	1.50	250.00	4.00	3	20.00	A	197202
3.00	8.00	64.00	14.50	1.50	1000.00	4.00	3	12.50	A	797202
3.00	8.00	64.00	10.50	1.50	250.00	4.00	3	20.00	D	207202
3.00	8.00	64.00	14.50	1.50	1000.00	4.00	3	12.50	D	897202
3.00	8.00	64.00	10.50	1.50	250.00	4.00	3	20.00	S	307202
3.00	8.00	64.00	14.50	1.50	1000.00	4.00	3	12.50	S	997202
4.00	10.00	73.00	12.50	2.00	250.00	5.00	3	20.00	A	197203
4.00	10.00	73.00	16.50	2.00	1000.00	5.00	3	12.50	A	797203
4.00	10.00	73.00	12.50	2.00	250.00	5.00	3	20.00	D	207203
4.00	10.00	73.00	16.50	2.00	1000.00	5.00	3	12.50	D	897203
4.00	10.00	73.00	12.50	2.00	250.00	5.00	3	20.00	S	307203
4.00	10.00	73.00	16.50	2.00	1000.00	5.00	3	12.50	S	997203
6.00	12.00	84.00	13.50	3.00	250.00	6.00	3	20.00	A	197204
6.00	12.00	84.00	19.50	3.00	1000.00	6.00	3	12.50	A	797204
6.00	12.00	84.00	13.50	3.00	250.00	6.00	3	20.00	D	207204
6.00	12.00	84.00	19.50	3.00	1000.00	6.00	3	12.50	D	897204
6.00	12.00	84.00	13.50	3.00	250.00	6.00	3	20.00	S	307204
6.00	12.00	84.00	19.50	3.00	1000.00	6.00	3	12.50	S	997204
8.00	16.00	93.00	18.50	4.00	500.00	8.00	3	20.00	A	197205
8.00	16.00	93.00	18.50	4.00	500.00	8.00	3	20.00	D	207205
8.00	16.00	93.00	18.50	4.00	500.00	8.00	3	20.00	S	307205
8.00	16.00	93.00	18.50	4.00	1500.00	8.00	3	20.00	A	197208
8.00	16.00	93.00	18.50	4.00	1500.00	8.00	3	20.00	D	207208
8.00	16.00	93.00	18.50	4.00	1500.00	8.00	3	20.00	S	307208

See page 63 for cutting data

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 opposite page). Cutting on the flank allows speeds to be maintained over the feature.

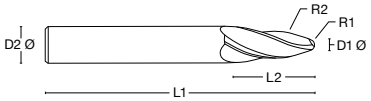
The tangential geometry provides what is effectively a two-in-one tool, giving you both side and ball nose cutting. Finishing and semi-finishing performance is excellent as are flank profiling operations and machining steep walls, flat planes and faces with minimal curvature.

With the correct CAM cycles tangential barrel tools are capable of optimised tool paths and strategies, accessing areas the conical cannot. We use OPEN MIND *hyper*MILL® in-house as our CAM provider. See page 50 for more information.

Eliminator barrel tools are suitable for sharpening and recoating multiple times with our QuickEdge programme (see page 51), increasing your profitability while at the same time reducing your carbon footprint.

High temp alloys S		Stainless M		
Inconel Hastelloy Incoloy	Titanium alloys Ti6AL4V Ti5Al-5V-5Mo	Precipitation 13-8/15-5 17-4PH	Austenitic 303/304/316L	Martensitic 403/410/416

S

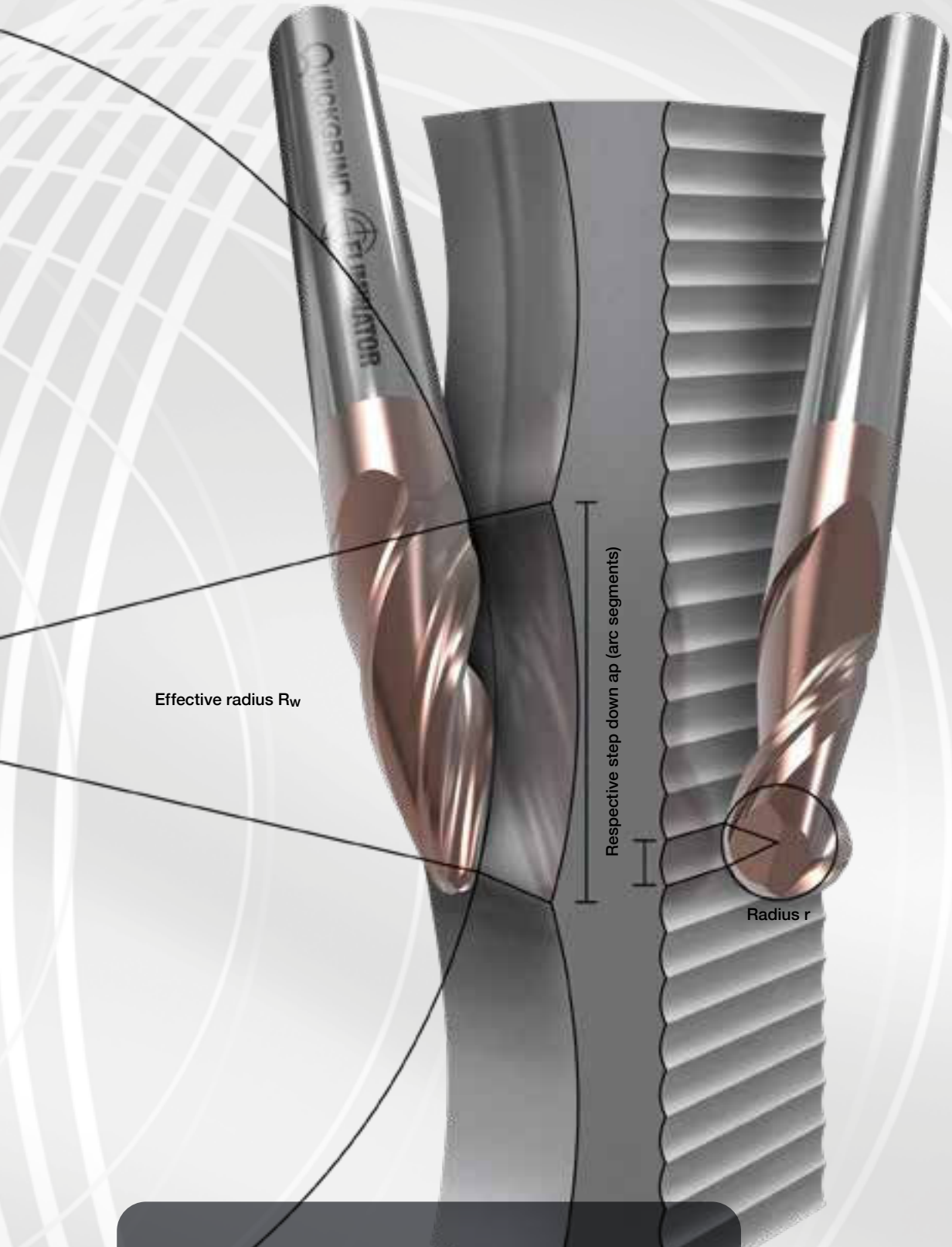


Eliminator tangential barrel tool

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 63 for cutting data

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



Eliminator versus ballnose

Eliminator's large radius of curvature (R_W) 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.

RIBCUTTER

High Performance Rib-Type Ball Nose End Mills

Reaches
the parts…

Tool shown 309045

CXPlus coating for smooth operations and extended tool life

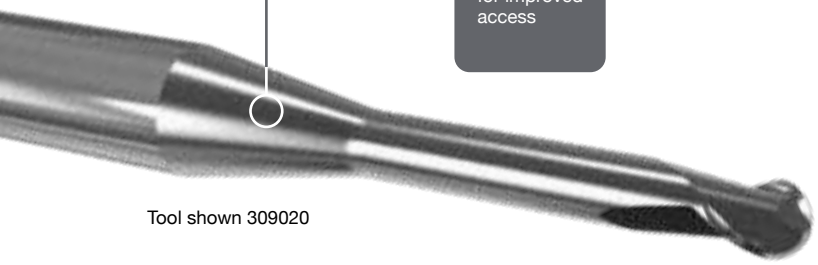
Our Ribcutter ball nose end mills are designed to overcome a multitude of production issues where small diameter tools are required.

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

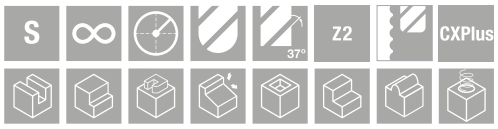
Solid carbide and coated with our unique CXPlus coating they are ideally suited for use in aluminium, titanium and stainless steels.

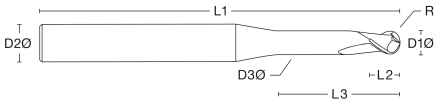
Ribcutter is available ex-stock or on a short delivery. Other sizes are available as part of our Infinite Possibilities® range.

Neck relief for improved access



Tool shown 309020





Sizes from 0.30mm Ø (1.00mm Ø shown)

Tool shown 309010

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

Ribcutter 2 flute rib-type ball nose end mill for all materials

D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
0.30	4.00	0.28	50.00	0.30	3.00	0.15	2	309230
0.30	4.00	0.28	50.00	0.30	6.00	0.15	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	0.20	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	6.00	0.25	2	309251
0.60	4.00	0.58	50.00	0.60	6.00	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	6.00	0.40	2	309280
0.80	4.00	0.78	50.00	0.80	12.00	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	6.00	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	50.00	2.50	15.00	1.25	2	309026
2.50	4.00	2.40	50.00	2.50	25.00	1.25	2	309027
2.50	4.00	2.40	58.00	2.50	35.00	1.25	2	309028
3.00	6.00	2.90	58.00	3.00	16.00	1.50	2	309030
3.00	6.00	2.90	58.00	3.00	20.00	1.50	2	309035
3.00	6.00	2.90	58.00	3.00	30.00	1.50	2	309031
3.00	6.00	2.90	58.00	3.00	45.00	1.50	2	309032
4.00	6.00	3.90	58.00	4.00	16.00	2.00	2	309040
4.00	6.00	3.90	58.00	4.00	20.00	2.00	2	309045
4.00	6.00	3.90	58.00	4.00	30.00	2.00	2	309041
4.00	6.00	3.90	58.00	4.00	45.00	2.00	2	309042
5.00	6.00	4.90	58.00	5.00	15.00	2.50	2	309050
5.00	6.00	4.90	58.00	5.00	20.00	2.50	2	309051

See page 64 for cutting data

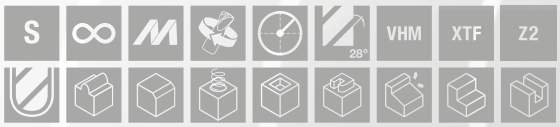
WARRIOR

High Performance Ball Nose End Mills

Winning in **hardened steels**

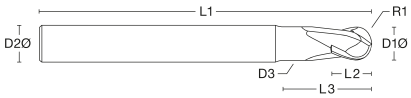
Reduced cycle times

Our Warrior 2 flute ball nose has been honed through experience by our R&D experts. The recipe of submicrograin solid carbide substrate and specially developed coating deliver excellent tool life in hardened tool steels and Inconels.



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

Warrior 2 flute ball nose end mill for hardened steels

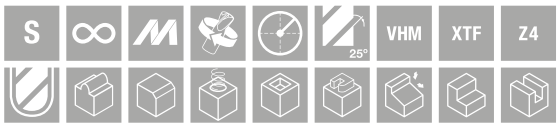


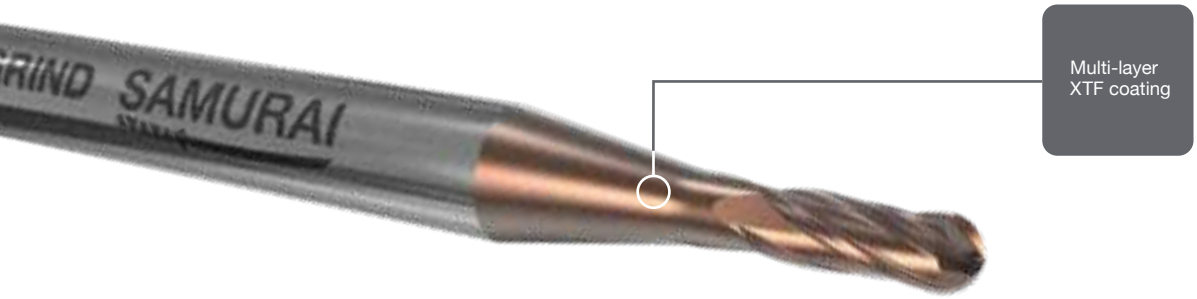
D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
2.00	3.00	1.90	50.00	2.00	10.00	1.00	2	210020
2.00	4.00	1.90	40.00	2.00	4.00	1.00	2	210021
2.00	6.00	1.90	60.00	2.00	4.00	1.00	2	210022
2.00	6.00	1.90	80.00	2.00	20.00	1.00	2	210023
2.00	6.00	1.90	80.00	2.00	35.00	1.00	2	210024
2.50	6.00	2.40	60.00	2.50	5.00	1.25	2	210025
3.00	3.00	-	50.00	3.00	-	1.50	2	210030
3.00	4.00	2.80	40.00	3.00	6.00	1.50	2	210031
3.00	6.00	2.80	60.00	3.00	6.00	1.50	2	210032
3.00	6.00	2.80	80.00	3.00	20.00	1.50	2	210033
3.00	6.00	2.80	80.00	3.00	40.00	1.50	2	210034
3.50	6.00	3.20	65.00	3.50	7.00	1.75	2	210035
4.00	4.00	-	40.00	4.00	-	2.00	2	210040
4.00	4.00	-	60.00	4.00	-	2.00	2	210041
4.00	6.00	3.70	65.00	4.00	8.00	2.00	2	210042
4.00	6.00	3.70	80.00	4.00	20.00	2.00	2	210043
4.00	6.00	3.70	80.00	4.00	52.00	2.00	2	210044
5.00	5.00	-	60.00	5.00	-	2.50	2	210050
5.00	6.00	4.60	50.00	5.00	10.00	2.50	2	210051
5.00	6.00	4.60	65.00	5.00	10.00	2.50	2	210052
5.00	6.00	4.60	100.00	5.00	50.00	2.50	2	210053
5.00	8.00	4.60	100.00	5.00	56.00	2.50	2	210054
6.00	6.00	-	50.00	6.00	-	3.00	2	210060
6.00	6.00	-	75.00	6.00	-	3.00	2	210061
6.00	6.00	-	100.00	6.00	-	3.00	2	210062
6.00	8.00	5.60	75.00	6.00	12.00	3.00	2	210063
6.00	8.00	5.60	100.00	6.00	56.00	3.00	2	210064
6.00	10.00	5.60	125.00	6.00	62.00	3.00	2	210065
8.00	8.00	-	65.00	8.00	-	4.00	2	210080
8.00	8.00	-	110.00	8.00	-	4.00	2	210081
8.00	8.00	7.40	75.00	8.00	16.00	4.00	2	210082
8.00	10.00	7.40	125.00	8.00	62.00	4.00	2	210083
8.00	12.00	7.40	150.00	8.00	67.00	4.00	2	210084
10.00	10.00	-	65.00	10.00	-	5.00	2	210100
10.00	10.00	-	125.00	10.00	-	5.00	2	210101
10.00	10.00	9.40	80.00	10.00	20.00	5.00	2	210102
10.00	12.00	9.40	125.00	10.00	61.00	5.00	2	210103
10.00	12.00	9.40	150.00	10.00	79.00	5.00	2	210104
12.00	12.00	-	125.00	12.00	-	6.00	2	210120
12.00	12.00	11.40	90.00	12.00	24.00	6.00	2	210121

See page 66 for cutting data

Killer
performance

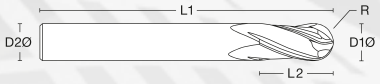
When the application requires four flutes, our Samurai is more than a match for those demanding situations. Superior submicrograin solid carbide and multi-layer XTF coating results in excellent tool life in the most complex components.





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

Samurai 4 flute ball nose end mill for hardened steels



D1 Ø mm	D2 Ø mm	L1 mm	L2 mm	R mm	Teeth mm	Stock code
1.00	6.00	50.00	3.00	0.50	4	320010
1.00	6.00	58.00	3.00	0.50	4	310010
2.00	6.00	58.00	6.00	1.00	4	320020
2.00	6.00	60.00	6.00	1.00	4	310020
3.00	6.00	58.00	8.00	1.50	4	320030
3.00	6.00	70.00	8.00	1.50	4	310030
4.00	6.00	58.00	8.00	2.00	4	320040
4.00	6.00	70.00	8.00	2.00	4	310040
5.00	6.00	58.00	12.00	2.50	4	320050
5.00	6.00	80.00	12.00	2.50	4	310050
6.00	6.00	58.00	12.00	3.00	4	320060
6.00	6.00	80.00	12.00	3.00	4	310060
8.00	8.00	64.00	14.00	4.00	4	320080
8.00	8.00	90.00	14.00	4.00	4	310080
10.00	10.00	73.00	18.00	5.00	4	320100
10.00	10.00	100.00	18.00	5.00	4	310100
12.00	12.00	84.00	22.00	6.00	4	320120
12.00	12.00	110.00	22.00	6.00	4	310120

See pages 66 for cutting data

ZODIAC

High Performance Ball Nose End Mills

A stellar performer

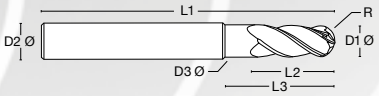
Tool shown 495918

XRed coating aids chip flow and resists wear

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

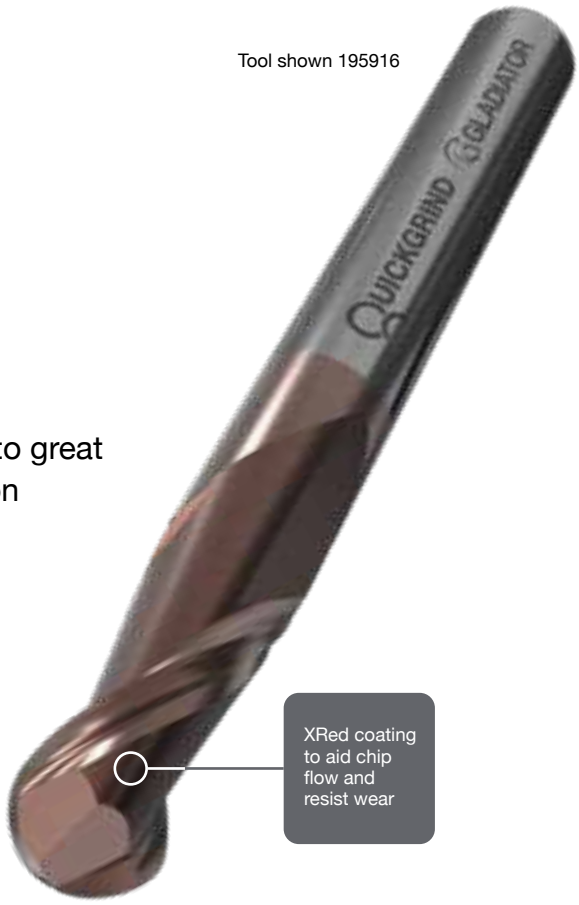
D1 Ø mm	D2 Ø mm	D3 Ø mm	L1 mm	L2 mm	L3 mm	R mm	Teeth Z	Stock code
3.00	6.00	2.80	58.00	10.00	15.00	1.50	4	495906
4.00	6.00	3.80	58.00	11.00	16.00	2.00	4	495908
5.00	6.00	4.70	58.00	13.00	18.00	2.50	4	495914
6.00	6.00	5.60	58.00	13.00	20.00	3.00	4	495915
8.00	8.00	7.50	64.00	18.00	27.00	4.00	4	495916
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	93.00	32.00	44.00	8.00	4	495944

See page 64 for cutting data

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

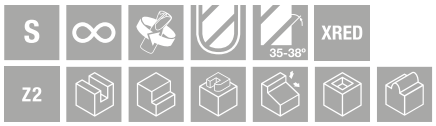
A real **winner**

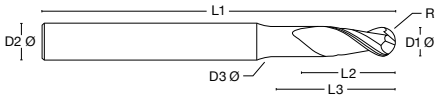
Tool shown 195916



This world beating 2 flute ball nose cutter is used to great effect 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	25.00	-	6.00	2	195918

See page 64 for cutting data

Tool shown 195913

High feed, **high ROI**

Tool shown 196206

Neck relieved to overcome reach issues

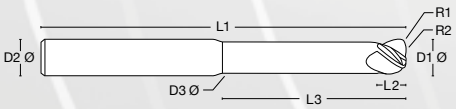
XRed coating to aid chip flow and resist wear

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



Spectre 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	64.00	6.00	30.00	0.67/5.33	3	196234
8.00	8.00	7.00	80.00	6.00	40.00	0.67/5.33	3	196204
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 62 for cutting data

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

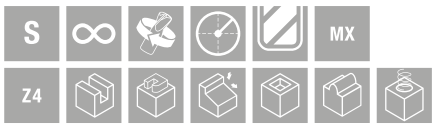
BULLDOG
High Feed End Mills

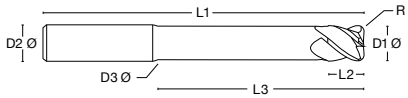
The very best of **British**

The superior mould and die tool, this state-of-the-art masterpiece produces exceptional results with significant productivity increases and reduced production costs.

Specially designed to reduce vibration under heavy cutting conditions and with high volume metal removal (HV-MRR), Bulldog is ideal for operations such as deep pocketing and slotting in difficult to machine materials without the push-off found with inferior tools.

Tool shown 8HXLLL





Bulldog 4 flute high feed end mill for mould and die steels/hardened steels

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	5.50	58.00	8.00	20.00	0.50	4	6HX
6.00	6.00	5.50	66.00	8.00	30.00	0.50	4	6HXL
8.00	8.00	7.50	64.00	10.00	35.00	1.00	4	8HX
8.00	8.00	7.50	90.00	10.00	50.00	1.00	4	8HXL
8.00	8.00	7.50	110.00	10.00	70.00	1.00	4	8HXLLL
10.00	10.00	9.30	73.00	10.00	35.00	2.00	4	10HX
10.00	10.00	9.30	90.00	10.00	50.00	2.00	4	10HXL
10.00	10.00	9.30	100.00	10.00	60.00	2.00	4	10HXLL
12.00	12.00	11.00	84.00	15.00	50.00	3.00	4	12HX
12.00	12.00	11.00	100.00	15.00	60.00	3.00	4	12HXL
12.00	12.00	11.00	125.00	15.00	80.00	3.00	4	12HXLL
16.00	16.00	15.00	100.00	15.00	60.00	3.50	4	16HX
16.00	16.00	15.00	125.00	15.00	80.00	3.50	4	16HXL
16.00	16.00	15.00	145.00	15.00	100.00	3.50	4	16HXLL

See page 63 for cutting data

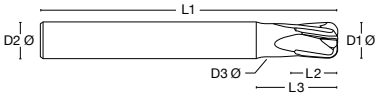
High feed
for hardened steels

Tool shown 510120

Available in sizes from 6.00 to 12.00mm this tool performs extremely well in hardened steels such as H13 and D2 ≥45Hrc.

A highly efficient roughing tool for producing pockets and cavities up to 1"/25mm deep, Reaper's 4 flutes and specially designed end geometry make it suitable for running at high speed and feed, taking shallow depths of cut.

The corner radii enable excellent chip thinning with rapid chip removal and long tool life. Reaper's end design also makes it suitable for flat bottom finishing.



Reaper 4 flute high feed end mill for steel/hardened steel

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	5.40	58.00	6.00	12.00	1.50	4	510060
8.00	8.00	7.50	64.00	8.00	16.00	2.00	4	510080
10.00	10.00	9.50	73.00	10.00	20.00	2.00	4	510100
12.00	12.00	11.05	84.00	12.00	24.00	3.00	4	510120

See page 63 for cutting data

Tool shown 510060

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

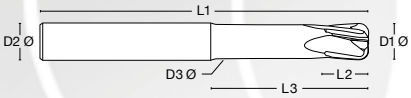
Longer reach
for improved access

Tool shown 530120

The same specification as the standard length version, Reaper-LS (Long Series) is available from 66mm to 100mm overall.

Tool shown 530060

End design for flat bottom finishing



Reaper-LS 4 flute high feed end mill for steel/hardened steel

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	5.40	66.00	6.00	24.00	1.50	4	530060
8.00	8.00	7.50	70.00	8.00	32.00	2.00	4	530080
10.00	10.00	9.50	85.00	10.00	40.00	2.00	4	530100
12.00	12.00	11.05	100.00	12.00	48.00	3.00	4	530120

See page 63 for cutting data

PHANTOM
High Feed End Mills

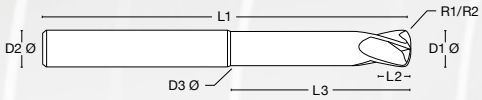
Four flutes, **extended life**

Tool shown 196306

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 (see page 51).

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.

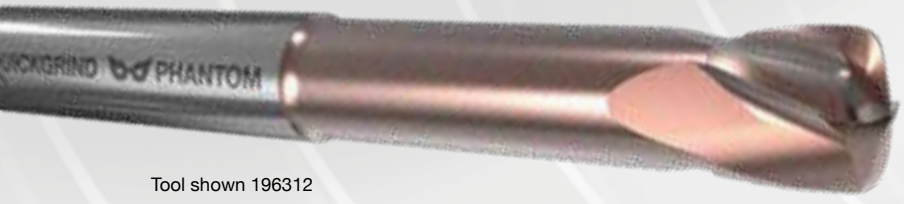
A relatively small depth of cut at high feed delivers great advantages to engineers and programmers.



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 62 for cutting data



Tool shown 196312

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

DEMON

High Performance End Mills

The strong **finisher**

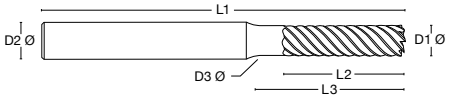
Tool shown 9286D16

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 9286D5



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	-	93.00	40.00	-	Yes	8	9286D16

See page 60 for cutting data

QUICKCAM®
ultimate profitability

Machining strategies
and cutting tool optimisation

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.

Contact us today to arrange your free initial assessment.

t +44 (0) 1684 294090

e quickcam@quickgrind.com

Benefits

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

QUICKEDGE®
tooling - good as new

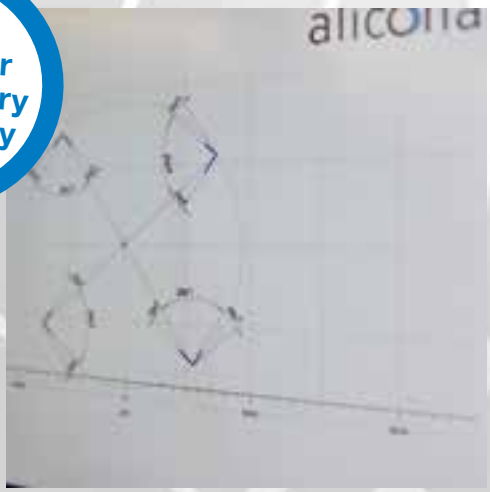
Adding value
to your tooling investment

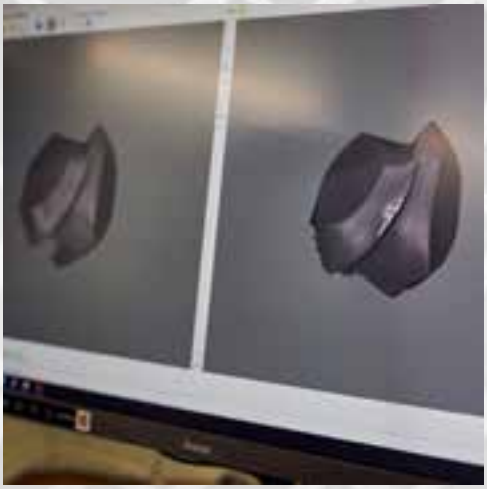
Many of our cutters are suitable for remanufacture. Our unique QuickEdge process can give you up to nine times extra usage out of your tooling, and with material (and environmental) costs increasing, the benefits of remanufacture are clear.

- 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





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

Call today
+44 (0) 1684 294090

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 300 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 and 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

@quickgrind

QUICKGRIND® Technical Centre

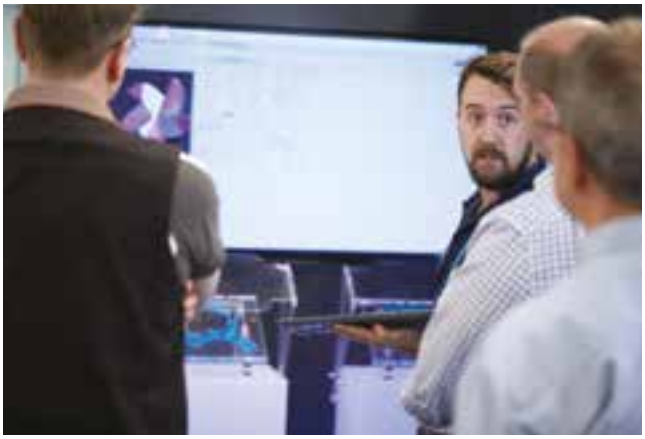
Improving
your machining performance

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



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 50Hrc.

Cutting speeds range from 40 to 250 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

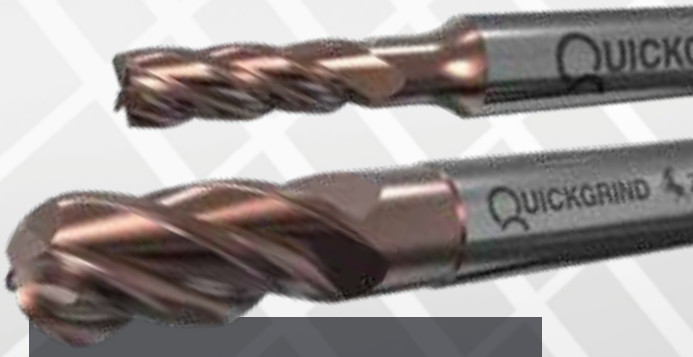
Coating material	AlTiN
Coating thickness	2-4µm
Deposition process	PVD Arc
Hardness HV 0.05	3300
Oxidation temperature	850°C
Coefficient of friction	<0.6
Process temperature	450-500°C
Colour	Blue/black

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 >45-55Hrc	■	■	■	■	■	■	■					
Tool steels >55-60Hrc	■	■	■	■	■	■						
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
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 60Hrc. 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.

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 >45-55Hrc										■	■	
Tool steels >55-60Hrc					■	■	■	■	■			
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.

TXPlus-R
ta-C Coating

A smooth
ta-C coating

Our TXPlus-R coating has been developed for the machining of non-ferrous metals, composite structures and plastic materials. With an sp3 content of 60%-70% it reaches a hardness of over 5000HV.

This thin, smooth and extremely hard coating is 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.

TXPlus-R also excels in cutting soft noble metals like gold, silver and copper as well as lead-containing and lead-free bronzes and brass alloys. Its variable thickness, very low coefficient of friction and anti-stick properties make it excellent for machining a wide range of plastics and sticky materials where it helps to avoid the build-up of material on the sharp cutting edge.

TXPlus-R supersedes conventional DLC coatings and is available on almost all of our solid carbide cutting tools.

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

TXPlus-R coated tools are also suitable for remanufacture and recoating thereby giving you even greater savings.

Technical data

Coating material	ta-C*
Coating thickness	<0.5
Deposition process	PVD Arc
Hardness HV 0.02	>5000
Oxidation temperature	500°C
Coefficient of friction	<0.1
Process temperature	Below 300°C
Adhesion	Very good, typically class 1
Colour	Rainbow

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

XTF

AlTiN/TiSiXN Coating

A dual-layer coating for **hardened materials**

Mould-making, aerospace and 3C (computers, communications and consumer electronics) operations push tooling to the limit when machining titanium, nickel-based alloys, stainless steel and hardened steel.

Quickgrind's dual-layer XTF coating provides outstanding oxidation resistance, high thermal stability and excellent wear resistance and is the perfect solution for machining these demanding materials.

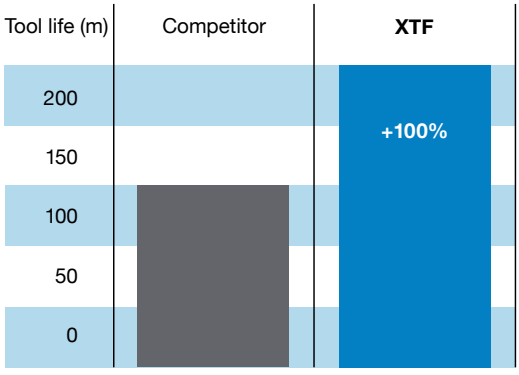
The AlTiN based layer offers high degree of ductility while the TiSiXN hardened layer resists oxidation and wear.

Other benefits include reduced crack formation and improved resistance to chipping, maintenance of high temperatures at the cutting edge and significant reductions in adhesive wear resulting in extended tool life.

Technical data

Coating materials	AlTiN/TiSiXN
Coating hardness HIT	38 +/-5 GPa
Deposition process	Arc
Intrinsic stress	-5 +/-1 GPa
Max service temperature	1100°C
Process temperature	<600°C
Colour	Bronze

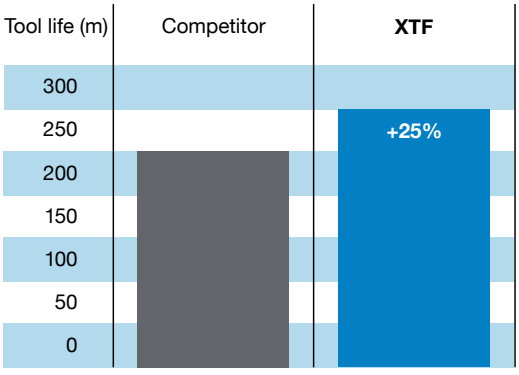
Nickel alloy



16mm Ø end mill / Nickel alloy 2.4650, NiCo20Cr20MoT (UNS N07263, Nimonic® C-263) / V_c 45m/min / f_t 0.09 mm/tooth / a_p 0.50mm a_e variable

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

Hardened steel



10mm Ø end mill / Steel 1.2344, X40CrMoV5-1 (AISI H13, JIS SKD61) 45Hrc / V_c 220m/min / f_t 0.10 mm/tooth / a_p 10.00mm / a_e 0.50mm Wet

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

CXPlus
AlCrN Coating

Smoother, harder, **stronger**

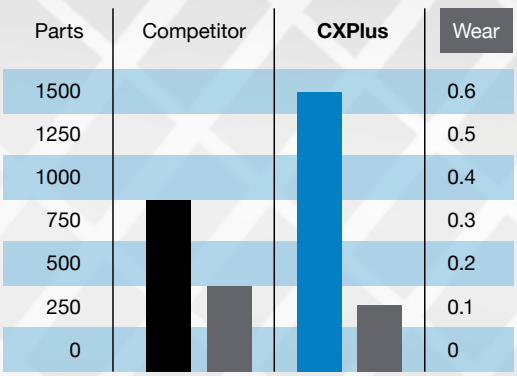
CXPlus's AlCrN advanced arc deposition process deposits coatings at far higher energy levels than conventional processes.

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)
$\frac{d \times \pi \times n \text{ (M/min)}}{1000}$	$\frac{Vc \times 1000 \text{ (rpm)}}{\pi \times d}$	$\frac{Vf \text{ (mm)}}{z \times n}$	Fz x z x 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
a_p = depth of cut (mm); a_e = width of cut

Calculation of average chip thickness

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

a_e 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

			AISI/SAE	Europe
Steels	P1	Low carbon	EN1A, EN8, 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 1215, 133	1.0715, 1.1730, 1.0313, 1.0034, 1.0401, 1.0402, 1.1022, 1.1158, 1.0710, 1.0726, 1.1141, 1.0715, 1.0718, 1.0736
	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	1.0528, 1.0501, 1.0511, 1.0503, 1.0540, 1.1191, 1.1221, 1.1218, 1.0618, 1.1127, 1.5025, 1.5710, 1.7214, 1.7225, 1.7228, 1.5919, 1.6511, 1.5423, 1.7015, 1.7131, 1.3523, 1.7003, 1.7045, 1.7176, 1.8159, 1.6511, 1.2057, 1.2510, 1.2842, 1.1545
	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	1.3346, 1.3348, 1.3351, 1.3355, 1.3255, 1.3265, 1.3202, 1.2363, 1.2365, 1.2343, 1.2605, 1.2344, 1.2581, 1.2713, 1.2714 1.2330, 1.2542, 1.2057, 1.2080, 1.3343
Stainless steels	M1	Free machining	430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	1.4104, 1.4310, 1.4305, 1.4006, 1.4005, 1.4028, 1.4016, 1.4104
	M2	Austenitic, Martensitic, PH stainless	301, 302, High Tensile, 304, 304L, 305, 316, 420, 15-5PH, 17-4PH, 17-7PH	1.4310, 1.4300, High Tensile, 1.4301, 1.4306, 1.4303, 1.4401, 1.4021, 1.4545, 1.4548, 1.4568
	M3	Cobalt chrome alloys, Duplex 22%, Super Duplex 25%	302B, 304B, 309, 310, 316b, 316L, 316Ti, 317, 317L, PH13-8Mo, Nitronics	1.4326, 1.4301, 1.4828, 1.4845, 1.4404, 1.4573, 1.4438, 1.4534, Nitronics
Cast irons	K1	Grey cast iron (GG) <180HB	ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, Grades G1800, G3000, G3500, GG10, 15, 20, 25, 30, 35, 40	ASTM A48, CLASS 20, 25, 30, 35, SAE J431C; Grades G1800, G3000, G3500, GG10, 0.6015, 0.6020, 0.6025, 0.6030, GG35, GG40
	K2	Ductile cast iron	-	-
	K3	Malleable cast iron (SG) 180>260HB	60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	0.7040, 0.7050, D4018, D4512, D5506, 0.8135, M3210, M4504, M5503, 250, 300, 350, 400, 450
Non-ferrous	N1	Aluminium < 10% Si	Aluminium/Aluminium Alloys < 10% Si	Aluminium/Aluminium Alloys <10% Si
	N2	Aluminium > 10% Si	Aluminium/Aluminium Alloys > 10% Si	Aluminium/Aluminium Alloys >10% Si
	N3	Copper/copper alloys, Brass/bronze	Brass, Cu/Cu Alloys/Magnesium	Brass, Cu/Cu Alloys/Magnesium
Special alloys	S1	High temp alloys	Nimonics, Inconel 625, 718, 925, Monel, Hastelloy	Nimonics, Inconel 625, 718, 925, 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	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	H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, D2, D3, D4, D5, D7	1.2365, 1.2343, 1.2605, 1.2344, 1.2581, 1.2067, 1.2713, 1.2714, 1.2379, 1.3343

Cutting speeds by material group

			Feed recommendations				
Tool diameter (mm)			**3.00**	**4.00**	**5.00**	**6.00**	**8.00**
		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	0.058-0.065
	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	0.008-0.015
	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	0.028-0.035	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	0.028-0.035	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	0.068-0.085	0.080-0.095	0.100-0.200	-
	N3	120-220	0.046-0.051	0.052-0.063	0.068-0.085	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**
			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**	**0.05 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	0.080	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	0.080	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	0.080	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	0.080	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	0.080	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**
			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**	**0.05 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	0.180	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	0.180	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	0.180	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	0.200-0.300	0.250-0.400	0.300-0.450	0.400-0.600
Phantom a_p			-	-	-	0.400-0.600	0.500-0.700
Tool diameter (mm)			3.00	4.00	5.00	6.00	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	60-100	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			0.500-0.700	0.600-0.800	0.700-1.000	-	-
Phantom a_p			0.600-0.800	0.700-1.000	0.750-1.100	0.800-1.250	-
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	0.380	-
	P3	120-160	0.180	0.220	0.220	0.240	-
Stainless steels	M1	90-130	0.240	0.260	0.280	0.320	-
	M2	60-100	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	0.380	-
	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]			**0.300-0.450**	**0.400-0.600**	**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	0.600
	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

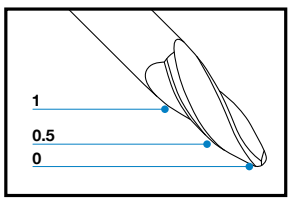
		Radial cut a_e 60-75% x D					
Reaper a_p			**0.200-0.350**	**0.300-0.400**	**0.350-0.500**	**0.400-0.650**	**-**
Tool diameter (mm)			**6.00**	**8.00**	**10.00**	**12.00**	**-**
		Vc (M/min)			**Feed per tooth[3] (mm)**		
Steels	P1	160-300	0.125	0.170	0.220	0.280	-
	P2	140-200	0.130	0.170	0.220	0.280	-
	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 ap 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	0.070-0.085	0.100-0.115	0.120-0.155
	K2	110-135	0.030-0.050	0.050-0.070	0.070-0.085	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	0.080-0.110	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**	**5.00**	**6.00**	**8.00**
		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	0.028	0.028	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	0.080	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

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	0.120-0.152	0.170-0.182	0.185-0.220	-
	N2	200-350	0.100-0.140	0.120-0.152	0.170-0.182	0.185-0.220	-
	N3	120-220	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 – trochoidal 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**
			ae	**ae**	**ae**	**ae**	**ae**	**ae**
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**
			ae	**ae**	**ae**	**ae**	**ae**	**ae**
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.

Cutting data – Warrior 2 flute ball nose end mills

Hardened steels 50-55Hrc H

Diameter (mm)	Radius (mm)	Vc (M/min)	n (rpm)	Fz (mm)	F (mm/min)	a_p (mm)	a_e (mm)	Teeth
2.00	1.00	180-205	30000	0.040	2400	0.15 - 0.25	0.25	2
3.00	1.50	170-195	19800	0.050	1980	0.20 - 0.35	0.38	2
4.00	2.00	170-185	14500	0.060	1740	0.25 - 0.40	0.50	2
5.00	2.50	175-185	12000	0.080	1920	0.28 - 0.45	0.63	2
6.00	3.00	165-185	9800	0.100	1960	0.35 - 0.50	0.75	2
8.00	4.00	165-180	7500	0.120	1800	0.40 - 0.57	1.00	2
10.00	5.00	160- 175	5700	0.140	1596	0.50 - 0.63	1.25	2
12.00	6.00	150-170	5400	0.160	1728	0.60 - 0.75	1.50	2

Hardened steels 55-65Hrc H

Diameter (mm)	Radius (mm)	Vc (M/min)	n (rpm)	Fz (mm)	F (mm/min)	a_p (mm)	a_e (mm)	Teeth
2.00	1.00	145-155	24000	0.058	2800	0.08	0.25	2
3.00	1.50	145-155	16000	0.088	2800	0.10	0.38	2
4.00	2.00	145-155	12000	0.111	2660	0.15	0.45	2
5.00	2.50	145-155	9600	0.133	2550	0.19	0.68	2
6.00	3.00	145-155	8000	0.153	2440	0.24	0.80	2
8.00	4.00	145-155	6000	0.140	1680	0.60	1.00	2
10.00	5.00	145-155	4800	0.171	1640	0.75	1.25	2
12.00	6.00	145-155	4000	0.186	1490	0.90	1.50	2

Cutting data – Samurai 4 flute ball nose end mills

Hardened steels 50-55Hrc H

Diameter (mm)	Radius (mm)	Vc (M/min)	n (rpm)	Fz (mm)	F (mm/min)	a_p (mm)	a_e (mm)	Teeth
1.00	0.50	130-140	41375	0.020	3310	0.06	0.13	4
2.00	1.00	130-140	20687	0.030	2482	0.10	0.25	4
3.00	1.50	130-140	13792	0.040	2207	0.13	0.38	4
4.00	2.00	130-140	10344	0.050	2069	0.15	0.50	4
5.00	2.50	130-140	8275	0.060	1820	0.20	0.63	4
6.00	3.00	130-140	6896	0.080	2069	0.25	0.75	4
8.00	4.00	130-140	5172	0.100	2069	0.30	1.00	4
10.00	5.00	130-140	4137	0.140	2317	0.50	1.25	4
12.00	6.00	130-140	3448	0.160	2207	0.60	1.50	4

Hardened steels 55-65Hrc H

Diameter (mm)	Radius (mm)	Vc (M/min)	n (rpm)	Fz (mm)	F (mm/min)	a_p (mm)	a_e (mm)	Teeth
1.00	0.50	100-110	31827	0.020	2546	0.06	0.12	4
2.00	1.00	100-110	15913	0.032	2037	0.08	0.25	4
3.00	1.50	100-110	10609	0.048	2037	0.10	0.38	4
4.00	2.00	100-110	7957	0.058	1846	0.15	0.45	4
5.00	2.50	100-110	6365	0.070	1782	0.19	0.68	4
6.00	3.00	100-110	5304	0.080	1697	0.24	0.80	4
8.00	4.00	100-110	3978	0.151	2400	0.60	1.00	4
10.00	5.00	100-110	3183	0.189	2400	0.75	1.25	4
12.00	6.00	100-110	2652	0.207	2200	0.90	1.50	4

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

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