Hardened materials range brochure Solid carbide tooling, modular tooling and drills

### Hard materials sharp results



UICKGRIND ST PANTHER

WARRIOR

SAMURA

NGRIND MIRAGE

ND (ELIMINATOR

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D MODX

SPECTRE

NEW

INFINITE POSSIBILITIES.®



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### Icons key

X ? 

Standard - available ex-stock

Customisable – Infinite Possibilities®

ModX<sup>®</sup> compatible – modular heads and shanks

Remanufacture compatible - regrind, recoat, reuse

Centre cutting

Helix angle

VHM

Coating type

Variable helix

Variable index

Number of teeth

Coated barrel tool

Coated ball nose

Coated corner radius

Orbis 270°

Chip breaker

Through-coolant

3D milling

Chamfer milling

Helical milling

Pocket milling

Profile milling

Ramping

Side finishing

Side roughing

Slot milling

Trochoidal milling

Chamfer drilling

Drilling

## Hard, fast, high quality

Unleash the power of precision with Quickgrind's premium solid carbide tools for hardened materials. Our cuttingedge range guarantees unparalleled performance, longevity and impeccable surface finishes.

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



#### Our standard tools are available ex-stock

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



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

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

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

#### This icon tells you which of our tools are ModX<sup>®</sup> compatible

Operating in 37 countries we have an international reputation for solid carbide cutting tools for every industry sector and our 'total solutions engineering' approach is so successful it has been expanded to include a range of compatible services including CAM strategies, remanufacture and tool vending. Our state-of-the-art Technical Centre is a purpose-built space for you to discover all of these services, to meet and talk to our specialists and to test our tools on your components see pages 34 to 40 to find out more.

Welcome to Quickgrind. We look forward to partnering with you and helping you to transform your efficiency, productivity and bottom line.

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



### **INFINITE POSSIBILITIES.**

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

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

Our hardened materials cutters can be designed specifically for your application and are available in virtually any size, diameter, radius, neck relief, coating or reach. Throughcoolant and other options are also available. Contact our team today to discuss your applications, aims and requirements.

There are no limits, only Infinite Possibilities.®

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

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

### 1. Choose your shank specLength • Diameter • Tolerance

DIN or other shank standards

Length 
 Diameter 
 Relief

2. Choose your neck spec

#### 3. Choose your head spec

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

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

That's Infinite Possibilities.®

UICKGRIND MIRAGE



Typhoon taper end mill with MX coating

### Because one size doesn't always fit all

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

To help you identify which of our tools are suitable for the Infinite Possibilities<sup>®</sup> process simply look for the infinity icon in the list of tooling features. It looks like this...

 $\infty$ 

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

Shown here are examples of just some of the bespoke hardened materials tools we have designed and made for our clients.

Why not ask us what we can do for you?

Typhoon 7 flute with XRed coating

UICKGRIND

Panther step drill with XRed coating

Super finisher



Orbis lollipop cutter with XRed coating

### **Quality and inspection**

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

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

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

### 

High Performance Ball Nose End Mills

# Winning in hardened steels

Reduced cycle times

WARRIOR

Our new 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.

| S | $\infty$   | М          | S | $\bigcirc$ | 28° | νнм | XTF        | Z2 |
|---|------------|------------|---|------------|-----|-----|------------|----|
|   | $\bigcirc$ | $\bigcirc$ |   |            |     |     | $\bigcirc$ |    |

ModX<sup>®</sup> Warrior head see page 16

> New multilayer XTF coating (see page 28)

UICKGRIND

Taper and neck relief versions available

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

WARRIOF



| D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm   | L1<br>mm | L2<br>mm | L3<br>mm | R<br>mm | Teeth<br>Z | Stock<br>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          | 210102        |
| 10.00      | 12.00      | 9 <u>4</u> 0 | 150.00   | 10.00    | 79 00    | 5.00    | 2          | 210104        |
| 12.00      | 12.00      |              | 125.00   | 12.00    | -        | 6.00    | 2          | 210104        |
| 12.00      | 12.00      |              | 120.00   | 12.00    |          | 0.00    | 2          | 210120        |

Superior submicrograin solid carbide

### **NEW SAMURAI**

S

High Performance Ball Nose End Mills

### Killer performance

When the application demands four flutes, our exciting new Samurai is more than a match for those demanding situations. Superior submicrograin solid carbide and newly developed coating results in excellent tool life in the most complex components.

> Multiflute options available





0 0 0 0 0

| NEW Sam    | <b>urai</b> 4 flute k | call nose end | mill for harde | ned steels |             | L1            | R<br>10<br>10 |
|------------|-----------------------|---------------|----------------|------------|-------------|---------------|---------------|
| D1 Ø<br>mm | D2 Ø<br>mm            | L1<br>mm      | L2<br>mm       | R<br>mm    | Teeth<br>mm | Stock<br>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 page 33 for cutting data

For the most difficult components and materials

### MIRAGE High Performance End Mills

### A cut above the rest

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

Suitable for trochoidal milling, Mirage allows for full flute engagement with step overs (ae) of anything from  $~\geq 5\%$  to  ${\leq}15\%$  in super alloys 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







|   | D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm | L1<br>mm | L2<br>mm | L3<br>mm | R<br>mm | Teeth<br>Z | Stock<br>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        |  |
| Γ | 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    | 1 - //   | 0.50    | 4          | 195645        |  |
|   | 16.00      | 16.00      | / -        | 93.00    | 32.00    | - //     | 1.00    | 4          | 195647        |  |
| Ī | 16.00      | 16.00      | - /        | 93.00    | 32.00    | -        | 1.50    | 4          | 195648        |  |
|   | 16.00      | 16.00      | - 97       | 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        |  |

Mirage 4 flute variable end mill for super alloys, titanium and hardened steels

See page 30 for cutting data

Tool shown 195652

Designed for multiple applications

QUICKGRIND MIRA

### MIRAGESUPER

High Performance End Mills

## M Ke JREDSL VMBABLE Z4 Z5 Z6 M Ke <

### Super by design

### Introducing the Mirage Super, for when your applications demand something out of the ordinary.

At Quickgrind we never stand still, we're always looking to offer more to our clients. Through clever design, experience and by using the latest grade of carbide and coating this tool takes our Mirage to new heights of performance, helping you to achieve your aims for critical parts in super alloys.

With our Mirage Super we have used the toughest substrate with a high wear resistant coating and polished flutes, together with a balancing option.

Don't forget, as part of our Infinite Possibilities<sup>®</sup> programme we will work with you to develop the right tools for your applications.

Variable index and variable flute XRedSL coating

High resistance to wear

UICKGEIND Shirese

Optional chip breakers

SMIRAGES





### **Innovating** for unlimited potential



Eliminator is an exciting range of barrel tools that takes the arc segment of a circle to form the radius of the flute, enabling improved step down strategies when compared to ball nose endmills and reducing cycle times by up to 90%.

Until now the conventional way to produce a required finish was to use a ball nose. This limits the step down, generally calculated as  $ap = 0.02 \times D1$ . For example, a 10.00mm diameter ball nose can achieve an ap of 0.20mm.

Increasing the step down would normally require a much larger diameter cutter which would not be practical – the Eliminator barrel tool does not have such limitations. The contact area is much greater because the flute radius is adapted from the segment of a much larger circle. If you wanted to increase the step down from 0.20mm to 5.00mm you would need a 250mm diameter ball nose. However, by taking a segment of a 250mm diameter circle to form the flute of your tool, and applying this to any diameter tool, you can achieve a 5.00mm step down. Available in (pictured left to right above) concave, lens type, tangential, form F and conical versions with geometries, number of flutes and dimensions to suit your individual applications, Eliminator significantly reduces finishing cycle times on deep pockets, shallow pockets with small radii, hard to reach faces, radial and tangential faces, blisks, vanes and moulds which would all normally require a ball nose.

Start your cycle time and finishing revolution today. Call +44 (0) 1684 294090 or visit quickgrind.com



#### Eliminator

12mm Ø R3 conical barrel tool with 250mm flute radius

Spindle speed - 7,958 rpm

Feedrate – 2,984 mm/min

2 minutes 11 seconds for each pocket

4 pockets machined in 8 minutes 46 seconds



| Ball nose                                 |
|-------------------------------------------|
| 6mm Ø ball nose                           |
| Spindle speed – 10,610 rpm                |
| Feedrate – 2,122 mm/min                   |
| 1 x middle pocket only                    |
| 1 pocket machined in 9 minutes 24 seconds |



## Transforming

finishing and semi-finishing strategies

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

By implementing highly efficient machining processes we are able to realise substantial gains from effective cost reductions per part, by as much as 25% or more, to free-up valuable machine hours. Machine times are a costly element in all production processes and cycle time reductions of 25% are hard to achieve and limited to the machine's capabilities. By using our Eliminator range to greatly reduce finishing process times these savings become a reality.



Force-resistive

submicrograin carbide for strength and toughness

Precision ground shank suitable for all types of tool <u>holder</u>

### Applications

- Replaces scanning with ball nose and corner radius endmills
- Highly efficient finishing and semi-finishing
- Profiling, flanks and steep walls
- Mill faces and blends with one tool
- Machining steep or flat planes
- Faces with minimal curvature

### **Benefits**

- Up to 90% cycle time reduction achievable
- Increased ap (step down) greatly reduced machining time
- Smaller cusp (scallop) height
- Tool path distance greatly reduced better for your machine
- Two-in-one tool side cutting and ball nose cutting
- Low Ra finish
- Reduced effects of thermal deformation (heat transfer)
- Long tool life
- Suitable for sharpening and recoating multiple times with our QuickEdge programme

XRed coating for longer tool life and wear resistance

Optimised geometries for high performance machining and durability

Conical, lens, tangential, form F and concave (shown) for a wide range of applications

Numerous flute configurations available

| D1 Ø<br>mm | D2 Ø<br>mm | L1<br>mm | L2<br>mm | R1<br>mm | R2<br>mm | R3<br>mm | Teeth<br>Z | α/2   | Туре | Stock<br>code |  |
|------------|------------|----------|----------|----------|----------|----------|------------|-------|------|---------------|--|
| 2.00       | 6.00       | 58.00    | 8.50     | 1.00     | 250      | 2.00     | 3          | 20.00 | S    | 872503        |  |
| 3.00       | 8.00       | 64.00    | 10.50    | 1.50     | 250      | 4.00     | 3          | 20.00 | S    | 307202        |  |
| 3.00       | 8.00       | 64.00    | 14.50    | 1.50     | 1000     | 4.00     | 3          | 12.50 | S    | 997202        |  |
| 4.00       | 10.00      | 73.00    | 12.50    | 2.00     | 250      | 5.00     | 3          | 20.00 | S    | 307203        |  |
| 4.00       | 10.00      | 73.00    | 16.50    | 2.00     | 1000     | 5.00     | 3          | 12.50 | S    | 997203        |  |
| 6.00       | 12.00      | 84.00    | 13.50    | 3.00     | 250      | 6.00     | 3          | 20.00 | S    | 307204        |  |
| 6.00       | 12.00      | 84.00    | 19.50    | 3.00     | 1000     | 6.00     | 3          | 12.50 | S    | 997204        |  |
| 8.00       | 16.00      | 93.00    | 18.50    | 4.00     | 500      | 8.00     | 3          | 20.00 | S    | 307205        |  |
| 8.00       | 16.00      | 93.00    | 18.50    | 4.00     | 1500     | 8.00     | 3          | 20.00 | S    | 307208        |  |

### Eliminator tangential barrel tool

| D1 Ø<br>mm | D2 Ø<br>mm | L1<br>mm | L2<br>mm | R1<br>mm | R2<br>mm | Teeth<br>Z | Geometry | Stock<br>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 31 for cutting data





Also Infinite Possibilities® compatible - choose your spec (page 4)



R1







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

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

#### **Features and benefits**

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

Solid carbide modular shank Superior rigidity to stainless steel alternatives Stepped or tapered Neck section can be straight or tapered depending on reach requirements ModX<sup>®</sup> coupling Self-centering screw thread for secure connection and maximum strength Modular heads

From end mills to barrel tools, all fully customisable with our Infinite Possibilities® programme

### QUICKGRIND MODX

ModX<sup>®</sup> thread Unique locking mechanism ensures maximum coupling stability

Wrench point Simple but effective tightening of the head into the shank – a physical stop indicates when the head is correctly tightened



#### End mills

A collection of 4 to 7 flute square and corner rounded variable end mills with XRed coating and geometries for hardened steels and special alloys in a wide range operations.



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



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



#### High feed end mills The precision ground end geometry of our high feed ranges allows for highly efficient chip removal at high feed rates. The tools lend themselves to roughing and semifinishing operations in deep and shallow pockets.



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



Multiflute tools Designed for super-fine finishing applications in steels, hardened steels and exotics, Demon's higher speeds and feeds rates deliver increased productivity and high material removal rates.

Working with you to transform your operations

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

### **A new standard** for complex components



Orbis lollipops work extremely well and Quickgrind's service is second to none. The fact that they will make the tools to any design is a great help when programming parts. The flexibility in Quickgrind's manufacture process enabled us to create the exact lollipop cutter for our medical application. *Mihail Seckie, Takumi Precision Engineering* 

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

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

> Up to 300° plus spherical cutting options

Force-resistive submicrograin carbide for strength and toughness

2 to 8 flutes and coating options

Spherical cutting in all directions

### Applications and benefits

- Spherical cutting in all directions
- Sphere angle only limited by neck diameter
- Huge options of neck reach and diameter
- Multiple flute numbers

Tapered neck and radial runout options for clearance and strength

DIN or other shank standards as required

- Uncoated and coated
- High speed cutting HSC
- Machine manifolds and ports
- Helical interpolation
- · Milling of complex thin walled components
- Machining contour shapes



Strengthened core and enhanced vibration suppression

### BULLDOG

High Feed End Mills



# The very best of **British**

The superior mould and die tool, Bulldog is available in an almost infinite choice of size, diameter, radius and reach. Ask about our Long Series variant for operations that require extra reach.

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 push-off.

Higher speeds and feeds are possible, increasing your productivity still further, while suppressed vibration and harmonics reduce machining forces leading to increased tool life. You can expect exceptional results, significant productivity increases and reduced costs with this tool.

Other features include enhanced radii geometry to ensure high stability, unequal helix and variable flute design and a strengthened core.

Bulldog is ideal for roughing applications in mould and die steels and is suitable for tool steels such as H11, H13, D2 and P20 and hardened alloys up to 62Hrc.

Neck relieved to overcome reach issues

XRed coated for difficult materials

| S | $\infty$ | <b>S</b> | $\bigcirc$ | XRED | Z4 |  |
|---|----------|----------|------------|------|----|--|
|   |          |          |            |      |    |  |

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

D2 Ø

| D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm | L1<br>mm | L2<br>mm | L3<br>mm | R<br>mm | Teeth<br>Z | Stock<br>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        |
|            |            |            |          |          |          |         |            |               |

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### SPECTRE

High Feed End Mills

Tool shown 196206

XRed coating to aid chip flow and resist wear

## High feed, **high ROI**

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

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

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

Neck relieved to overcome reach issues

Tool shown 196201

| S | $\infty$ | М | XRED | <b>Z</b> 3 |  |
|---|----------|---|------|------------|--|
| P |          |   |      |            |  |



### Spectre 3 flute high feed end mill

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

### REAPER

High Performance High Feed End Mills



## High feed for hardened steels

## Available in sizes from 6.00 to 12.00mm this tool performs extremely well in hardened steels such as H13 and D2 $\geq$ 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.



| S          | $\infty$ | М | XRED | Z4 |  |
|------------|----------|---|------|----|--|
| $\bigcirc$ |          |   |      |    |  |



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

| D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm | L1<br>mm | L2<br>mm | L3<br>mm | R<br>mm | Teeth<br>Z | Stock<br>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        |  |



### REAPER-LS

High Performance High Feed End Mills



Tool shown 530120

# Longer reach for improved access

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



| S | $\infty$ | <b>S</b> | XRED | Z4 |  |
|---|----------|----------|------|----|--|
| P |          |          |      |    |  |

|      | L1      |     |
|------|---------|-----|
| D2 Ø |         | DIØ |
|      | D3 Ø -/ |     |

sign for flat bottom finishing

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

| D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm | L1<br>mm | L2<br>mm | L3<br>mm | R<br>mm | Teeth<br>Z | Stock<br>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        |  |

Tool shown 196306

### **PHANTOM**

High Feed End Mills

| • |  |   |  |
|---|--|---|--|
|   |  | 0 |  |

## Four flutes, extended life

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

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

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





### Phantom 4 flute high feed lens tool

| D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm | L1<br>mm | L2<br>mm | L3<br>mm | R1/R2<br>mm | Teeth<br>Z | Stock<br>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 30 for cutting data

Neck relieved to

Designed to be

remanufactured

multiple times

overcome reach issues



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Force-resistive submicrograin carbide

for strength and toughness

#### 👑 DEMON

S

High Performance End Mills

# The strong **finisher**

### 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.

#### Multiflute count provides high core strength

Long reach

option available

Tool shown 9286D16



CKGRIND W DEMON

| S    | $\infty$ | М | <b>%</b> | $\bigcirc$ | 50° |
|------|----------|---|----------|------------|-----|
| XRED | Z6/8     |   |          | $\bigcirc$ |     |

|        | L1      |    |
|--------|---------|----|
| 2<br>Ø |         |    |
|        | D3 Ø -/ | L2 |

### Demon 8 flute end mill for finishing operations

D

| D1 Ø<br>mm | D2 Ø<br>mm | D3 Ø<br>mm | L1<br>mm | L2<br>mm | L3<br>mm | Square corner | Teeth<br>Z | Stock<br>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       |  |

### **SANTHER**

High Performance Solid Carbide Drills

∞ 🐝 xred 🕎 🖗

• • • •

## Accuracy up cycle times down

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

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

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

Panther drills are suitable for machining a wide variety of materials. We design the tools with relevant geometries, with or without coatings, to suit your specifications.

Highly accurate bores in one pass

Optimised point geometries

XRed coating



submicrograin carbide for strength and toughness

> DIN or other shank standards as required

Single or multiple steps with chamfer angles as required

### PUMA HRSA-TC & HRSA-D

High Performance Solid Carbide Drills

HRSA-D

## A tough drill for tough materials

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

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

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

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

Micrograin solid carbide and a choice of coatings (PG shown) Point geometries and margin options optimised for excellent resistance to tool wear

**HRSA-TC** 

Through-coolant reduces cutting forces and temperatures

### XRed/XRedSL

**TiSiN** Coating

# The coating for **challenging conditions**

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

Its multi-layer coating, with crystalline TiN matrix/Si $_3N_4$  nano crystallite outer layer, is designed to protect the cutting edge from excess wear, oxidation and heat transfer.

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

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

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



### **Technical data**

| Coating material        | TiSiN     |
|-------------------------|-----------|
| Coating thickness       | 2-4µm     |
| Deposition process      | PVD Arc   |
| Hardness HV 0.05        | 3500      |
| Oxidation temperature   | 1100°C    |
| Coefficient of friction | <0.4      |
| Process temperature     | 450-550°C |
| Colour                  | Copper    |
|                         |           |

| Cutting speed M/min                       | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 250 | 300 |
|-------------------------------------------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Steels up to 700 N/mm <sup>2</sup>        |    |    |    |     |     |     |     |     |     |     |     |     |
| Steels 800-1000 N/mm <sup>2</sup>         |    |    |    |     |     |     |     |     |     |     |     |     |
| Steels >1400 N/mm <sup>2</sup>            |    |    |    |     |     |     |     |     |     |     |     |     |
| Tool steels >45-55 Hrc                    |    |    |    |     |     |     |     |     |     |     |     |     |
| Tool steels >55-60 Hrc                    |    |    |    |     |     |     |     |     |     |     |     |     |
| Cast iron                                 |    |    |    |     |     |     |     |     |     |     |     |     |
| Martensitic stainless steels              |    |    |    |     |     |     |     |     |     |     |     |     |
| Austenitic stainless steels               |    |    |    |     |     |     |     |     |     |     |     |     |
| Titanium up to 900 N/mm <sup>2</sup>      |    |    |    |     |     |     |     |     |     |     |     |     |
| Titanium alloys >900 N/mm <sup>2</sup>    |    |    |    |     |     |     |     |     |     |     |     |     |
| Nickel alloys up to 900 N/mm <sup>2</sup> |    |    |    |     |     |     |     |     |     |     |     |     |
| Nickel alloys >1200 N/mm <sup>2</sup>     |    |    |    |     |     |     |     |     |     |     |     |     |

Cutting data is subject to application and machining parameters. Please contact our Technical Support team for advice. **XTF** AITiN/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 new 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 AITiN 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 material        | AITIN / 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         |



16mm Ø end mill / Nickel alloy 2.4650, NiCo20Cr20MoT (UNS N07263, Nimonic® C-263) / V\_C 45m/min / ft 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

| Tool life (m) | Competitor | XTF  |
|---------------|------------|------|
| 300           |            |      |
| 250           |            | +25% |
| 200           |            |      |
| 150           |            |      |
| 100           |            |      |
| 50            |            |      |
| 0             |            |      |

10mm Ø end mill / Steel 1.2344, X40CrMoV5-1 (AISI H13, JIS SKD61) 45Hrc / V\_c 220m/min / ft 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.

### Technical data

#### **Milling formula**

| Cutting speed (Vc)              | Spindle speed (n) | Feed per tooth (Fz) | Table feed (Vf)     |
|---------------------------------|-------------------|---------------------|---------------------|
| $d \times \pi \times n$ (M/min) | Vc x 1000 (rpm)   | Vf (mm)             | Fz x z x n (mm/min) |
| 1000                            | π x d             | z x n               |                     |

Vc = cutting speed (m/min); z = number of flutes; Fz = feed per tooth (mm); n = spindle speed (rpm); d = tool diameter (mm);  $\pi$  = 3.142  $a_p$  = depth of cut (mm);  $a_e$  = width of cut

#### Calculation of average chip thickness

| hm = Fz √ <u>ae</u> | Fz = hm√d |
|---------------------|-----------|
| d                   | ae        |

**a**<sub>e</sub> max = maximum lateral infeed depending on the material to be machined (mm); **F**z = feed per tooth (mm); **h**m = average chip thickness (mm); **d** = tool diameter (mm)

### Workpiece materials key

| Special<br>alloys S2 | S1 | High temp alloys            | Nimonics, Inconel 625, 718, 925, Monel, Hastelloy                                     |
|----------------------|----|-----------------------------|---------------------------------------------------------------------------------------|
|                      | S2 | Titanium alloys             | 6AI-4V, 5AI-2.5 Sn, 6AI-2 Sn-4Zr-6Mo,<br>3AI-8V-6Cr4Mo-4Zr, 10V-2Fe-3AI, 13V-11cR-3AI |
| Hardened<br>steels   | Н  | Hardened steels (44-55 HRC) | H10, H11, H12, H13, H19, H21, L3, L6, L7,P2, P20, D2,<br>D3, D4, D5, D7               |

### Cutting speeds by material group

|                    |    |            |             |             | reed recommendati | ons         |             |
|--------------------|----|------------|-------------|-------------|-------------------|-------------|-------------|
| Tool diameter (mm) |    |            | 3.00        | 4.00        | 5.00              | 6.00        | 8.00        |
|                    |    | Vc (M/min) |             |             | Feed per tooth (m | n)          |             |
| 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    | н  | 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 (mr | n)          |   |
| 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    | н  | 40-50      | 0.025-0.035 | 0.030-0.040 | 0.035-0.045        | 0.040-0.050 | - |

### Cutting data - trochoidal milling

|                    |    |            | Feed recommendations |                |          |         |          |         |  |
|--------------------|----|------------|----------------------|----------------|----------|---------|----------|---------|--|
| Tool diameter (mm) |    |            | 6.00                 | 6.00           | 8.00     | 8.00    | 10.00    | 10.00   |  |
|                    |    |            | ae                   | a <sub>e</sub> | ae       | ae      | ae       | ae      |  |
| ap                 |    | ≤ 0.9 x L2 | 0.05 x D             | 0.1 x D        | 0.05 x D | 0.1 x D | 0.05 x D | 0.1 x D |  |
| 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    | Н  | Vc         | 60-90                | 60-90          | 60-90    | 60-90   | 60-90    | 60-90   |  |
|                    |    | Fz         | 0.050                | 0.040          | 0.060    | 0.050   | 0.090    | 0.070   |  |
|                    |    |            |                      |                |          |         |          |         |  |
| Tool diameter (mm) |    |            | 12.00                | 12.00          | 16.00    | 16.00   | 20.00    | 20.00   |  |
|                    |    |            | ae                   | a <sub>e</sub> | ae       | ae      | ae       | ae      |  |
| ар                 |    | ≤ 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 |  |
| 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    | Н  | 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 data - Bulldog, Spectre, Reaper and Phantom high feed end mills

|                    |    | Radial cut ae 6 | 0-75% x D   |             |                   |             |             |
|--------------------|----|-----------------|-------------|-------------|-------------------|-------------|-------------|
| Spectre ap         |    |                 | 0.150-0.250 | 0.200-0.300 | 0.250-0.400       | 0.300-0.450 | 0.400-0.600 |
| Phantom ap         |    |                 | -           | -           | -                 | 0.400-0.600 | 0.500-0.700 |
| Tool diameter (mm) |    |                 | 3.00        | 4.00        | 5.00              | 6.00        | 8.00        |
|                    |    | Vc (M/min)      |             | Fe          | eed per tooth (mm | ı)          |             |
|                    |    |                 |             |             |                   |             |             |
| 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    | н  | 80-140          | 0.040       | 0.055       | 0.060             | 0.070       | 0.080       |

|                    |    | Radial cut a <sub>e</sub> 6 | 0-75% x D   |             |                   |             |   |  |
|--------------------|----|-----------------------------|-------------|-------------|-------------------|-------------|---|--|
| Spectre ap         |    |                             | 0.500-0.700 | 0.600-0.800 | 0.700-1.000       | -           | - |  |
| Phantom ap         |    |                             | 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)                  |             | Fe          | eed per tooth (mm | ו)          |   |  |
|                    |    |                             |             |             |                   |             |   |  |
| 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    | Н  | 80-140                      | 0.090       | 0.120       | 0.140             | 0.180       | - |  |

|                       |   | Radial cut ae | 60-75% x D  |             |                             |             |   |
|-----------------------|---|---------------|-------------|-------------|-----------------------------|-------------|---|
| Reaper a <sub>p</sub> |   |               | 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 <sup>3</sup> | (mm)        |   |
| Hardened steels       | н | 80-140        | 0.100       | 0.140       | 0.180                       | 0.220       | - |

Note: Cutting data recommendations are guidelines only and are based on ideal cutting conditions. Subject to material group – use lower values for harder materials. Reaper-LS: 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 (mn | 1)          |             |  |  |  |
| 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    | Н  | 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 data – ball nose end mills

|                   |    |         |         |            |       | Feed  | recommenda     | ations |       |  |
|-------------------|----|---------|---------|------------|-------|-------|----------------|--------|-------|--|
| Tool diameter (mr | m) |         |         |            | 3.00  | 4.00  | 5.00           | 6.00   | 8.00  |  |
|                   |    | ap      | ae      | Vc (M/min) |       | Fee   | d per tooth (r | mm)    |       |  |
| 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   | н  | 0.1 x D | 0.5 x D | 80-140     | 0.027 | 0.027 | 0.027          | 0.033  | 0.045 |  |
|                   |    |         |         |            |       |       |                |        |       |  |
| Tool diameter (mr | m) |         |         |            | 10.00 | 12.00 | 16.00          | 20.00  | -     |  |
|                   |    | ap      | ae      | Vc (M/min) |       | Fee   | d per tooth (i | mm)    |       |  |
| 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   | н  | 0.1 x D | 0.5 x D | 80-140     | 0.054 | 0.062 | 0.077          | 0.088  | -     |  |
|                   |    |         |         |            |       |       |                |        |       |  |

### Cutting data - Warrior 2 flute ball nose end mills

| Hardened steels 5 | 0-55Hrc H   |            |         |         |            |                     |                     |       |
|-------------------|-------------|------------|---------|---------|------------|---------------------|---------------------|-------|
| Diameter (mm)     | Radius (mm) | Vc (M/min) | n (rpm) | Fz (mm) | F (mm/min) | a <sub>p</sub> (mm) | a <sub>e</sub> (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

| Diameter (mm) | Radius (mm) | Vc (M/min) | n (rpm) | Fz (mm) | F (mm/min) | ap (mm) | a <sub>e</sub> (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 5 | 50-55Hrc H  |            |         |         |            |                     |                     |       |
|-------------------|-------------|------------|---------|---------|------------|---------------------|---------------------|-------|
| Diameter (mm)     | Radius (mm) | Vc (M/min) | n (rpm) | Fz (mm) | F (mm/min) | a <sub>p</sub> (mm) | a <sub>e</sub> (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 5 | 5-65Hrc H   |            |         |         |            |                     |                     |       |
|-------------------|-------------|------------|---------|---------|------------|---------------------|---------------------|-------|
| Diameter (mm)     | Radius (mm) | Vc (M/min) | n (rpm) | Fz (mm) | F (mm/min) | a <sub>p</sub> (mm) | a <sub>e</sub> (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     |



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

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

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

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









### Benefits

- 24/7 secure access
- Allows minimum stock holding
- Automatic re-ordering
- User-friendly operation
- Tailor access to specific users and times
- Easy access to stock information and statistics

- Audit your tooling stock at the push of a button
- Suitable for new and remanufactured tools
- Stocks a wide range of tools types and sizes, and for high or low stock turnover
- Reduces purchase administration costs



### **QUICKGRIND**<sup>®</sup> 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.



 Quickgrind Limited
 Unit 5701
 Shannon Place
 Shannon Way

 Tewkesbury
 Gloucestershire
 GL20
 SSL
 United Kingdom

 t +44 (0)
 1684
 294090
 e contact@quickgrind.com
 w quickgrind.com

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