

**MIRAGE** **MIRAGE** **DELTA**  
SUPER  
High Performance End Mills



Superb in  
**super alloys**



INFINITE POSSIBILITIES.®

**QUICKGRIND**®  
carbide tooling



## 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.®

At Quickgrind we do not limit ourselves to standard ranges, and we do not limit you to tools we happen to have in stock and want to sell you. Instead, our mission is to provide you with solution-based tooling, to give you the right tool, for the right job, at the right price.

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

End the compromise of standard tooling. 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](http://quickgrind.com)

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

### 1. Choose your shank spec

- Length • Diameter
- Tolerance • Type HA/HB/HC
- Through-coolant
- Coolant grooves ...and more

### 2. Choose your neck spec

- Length • Relieved
- Diameter • Coolant grooves
- ...and more

### 3. Choose your head spec

- Diameter • Tolerance
- Length • Number of flutes
- Helix angle/s • Anti-vibration
- Radius • Chamfer
- Radial/axial through-coolant
- Bullnose • Coating
- Chip breakers ...and more



That's it. No catalogues to trawl through, no complicated product codes, no lengthy tables... 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.®

**Remember, just ask  
we will make it for you**

# Top flight performers

Designed for multiple applications in a wide range of materials especially stainless steel, titanium and super alloys, Mirage end mills provide unrivalled high performance. Delta, its three flute counterpart, also has extended reach as a normal feature.



## Features

- True thoroughbreds, giving high performance to discerning buyers, engineers and programmers around the world
- Mirage options include 4, 5 or 6 flute or more, stub and long flute, long series, chipbreakers and through-coolant
- With any combination of edge preparation, radius or reduced neck to allow you to optimise your programming and machining without compromise
- Unrivalled performance on titanium, inconel, duplex or stainless steel
- Suitable for trochoidal milling with full flute engagement as much as 3 x D
- Our chip-breaker versions reduce swarf to small, manageable sizes
- Capable of being reground and recoated a number of times with our remanufacturing service – reducing your tool budget by as much as 40%

## Excellent in these materials

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

## Limited use in these materials

Steels P	
Low alloy 1000/1100/1300	Medium alloy 200/252/300
Tool steels H13/P20/D2	High strength 420/5120
Hardened materials H	
Hardened steels 45-55 Hrc	



High Performance End Mills

# It's no illusion

Designed for multiple applications in a wide range of component materials, the Mirage end mill provides unrivalled high performance.

Over the past 7 years this tool has gone through many developments to the point where we are confident we have the right recipe of carbide grade, geometry and coating to compete on the world stage.

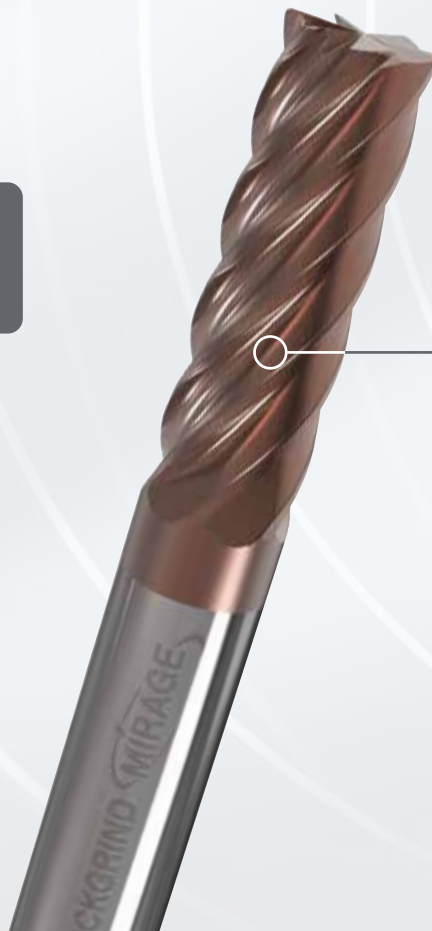
But we don't stop there... the key to our success is constant research and development. We live in an engineering world of ever-changing demands and at Quickgrind we have a strategy of ultimate flexibility. We encourage our clients to tell us what their issues, aims and future expectations are and through our Infinite Possibilities® programme we develop the optimised tools and cutting strategies for their production.



Bullnose  
& other  
geometries

TiN, TiAlN,  
TiSiN, AlCrN  
& other  
multilayer  
coatings

Variable index,  
variable flute,  
long flute,  
6 flutes or  
more & also  
chip breakers





High Performance End Mills

# A cut above the rest

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

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

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

This will require a longer than standard flute length which could lead to other issues. With our Infinite Possibilities® programme we can provide you with exactly the tool you need. For example you can have a 12mm diameter tool with 36.00mm or 40.00mm flute length rather than the usual 26.00mm.

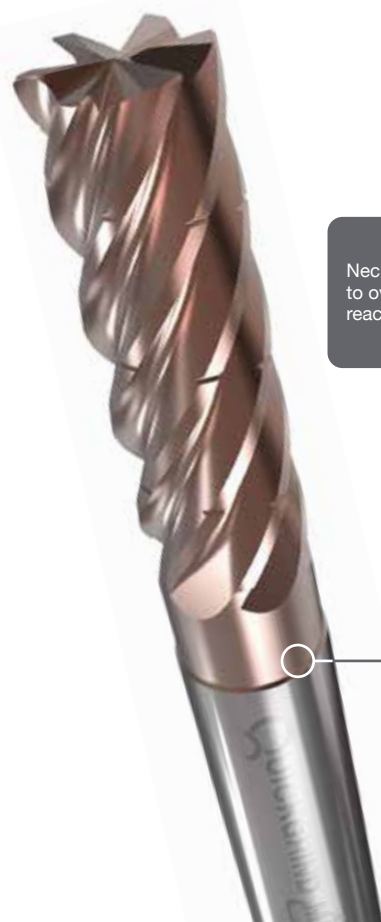
The Mirage range is available to you now, with custom-made tools on a short delivery – 4, 5, 6 flutes or more, with any radii or edge preparation you need, together with any length of flute, reach or overall length.

Call +44 (0) 1684 294090 or visit [quickgrind.com](http://quickgrind.com)



Chip breakers spaced to suit your needs

Longer than standard flute lengths



Neck relieved to overcome reach issues

## Applications

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

## Benefits

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



High Performance End Mills

# Any length you need

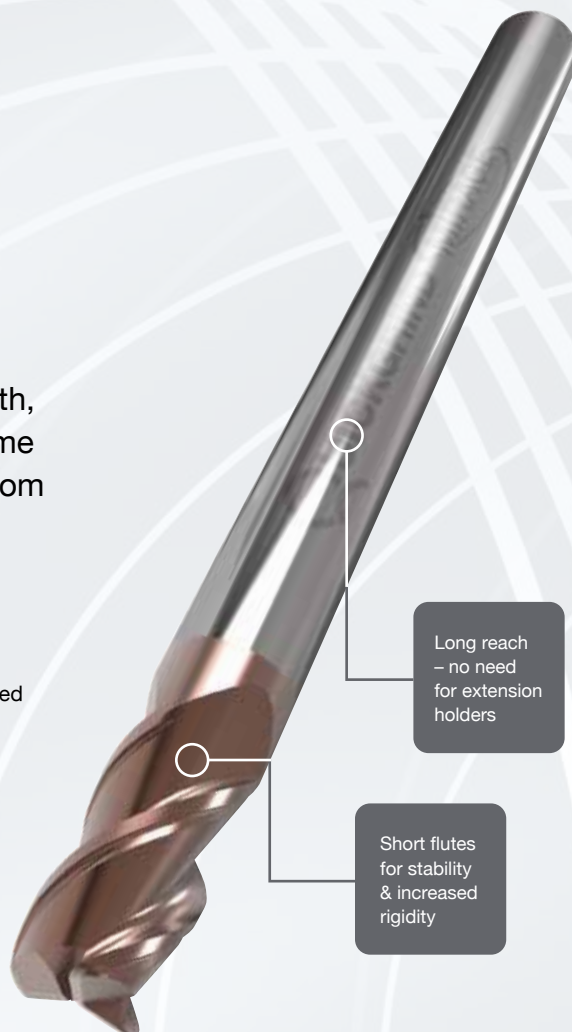
Some components will have features that require a non-standard tool, such as a greater overall length, an extended neck or a smaller diameter to overcome upstands and other obstacles, or to reach the bottom of a side wall or pocket.

Rather than reverting to modular tool holding or even special tool holders, talk to us and together we will design the optimal tool for your work. If you are worried this will incur high costs and long deliveries, our Infinite Possibilities® programme is here to provide you with exactly the tool you need at little more than a standard tool price and on a short delivery time.

Your production will benefit greatly by talking to us – we are here to help.

The Mirage long-series is available with 4, 5 and 6 flutes or more, any radii or edge preparation, any length of flute, reach or overall length.

Call +44 (0) 1684 294090 or visit [quickgrind.com](http://quickgrind.com)



Long reach  
– no need  
for extension  
holders

Short flutes  
for stability  
& increased  
rigidity



## Applications

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

## Benefits

- Higher feeds & speeds
- Higher wear resistance
- Vibration suppression
- Increased material removal rates



High Performance End Mills

# Tougher by design

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

At Quickgrind we never stand still, 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 new Super we have used toughest substrate with a high wear resistant coating and polished flutes, together with a balancing option.

Available to you now, and as part of our Infinite Possibilities® programme we will work with you to develop the right tools for your applications.

Remember, customise don't compromise.

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

4, 5, 6, 7  
or 9 flutes  
with edge prep  
as required

Designed  
for your  
applications

High  
resistance  
to wear



High Performance End Mills

# Three can be better than four

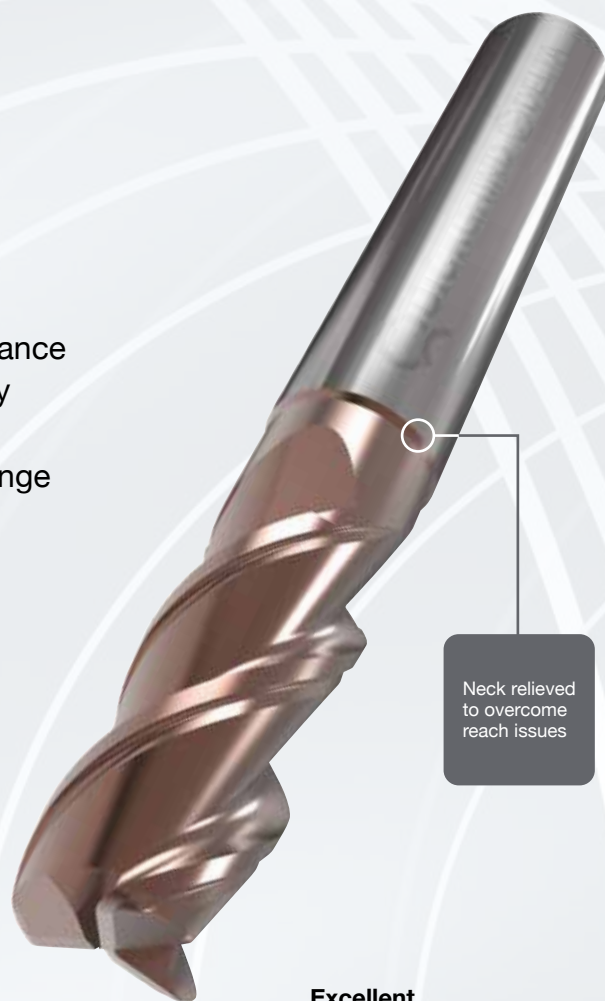
Certain applications benefit from a high performance end mill that has three flutes. Often normally only available in a general design and for non-ferrous materials from other manufacturers, our Delta range fits the bill nicely when machining super alloys.

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.



Neck relieved to overcome reach issues

## Excellent in these materials

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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

## Limited use in these materials

### Steels P

Low alloy  
1000/1100/1300

Medium alloy  
200/252/300

Tool steels  
H13/P20/D2

High strength  
420/5120

### Hardened materials H

Hardened  
steels  
45-55 Hrc



Optional  
Weldon  
shank

Extra long  
for super-  
extended  
reach



# The latest **machining strategies**

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? If so, you need QuickCam.

QuickCam is Quickgrind's advanced service designed specifically to support you with the machining of complex parts in difficult materials, like the bevel gear shown here.

Using Open Mind Hypermill MAXX machining as our in-house CAM software we provide accurate cycle time studies to show instant time savings on your parts. We also work with a number of CAM partners such as SolidCam, NCG Cam and Tebis as well as the verification software from CGVericut.

You may only require an optimised toolpath for a certain area of a part. We can provide an NC program which can be inserted into your existing program, enhancing the performance of your machining process and ultimately allowing more parts to pass through your machine shop.

And if you already have an optimised strategy for your machine, we can of course re-tool your component with our extensive range of high-performance solid carbide tooling.

Cycle time  
reductions  
of up to  
**90%**



## Benefits

- Reduced cycle times
- Reduced tooling costs
- Increased output
- Better due date performance
- Improved capacity
- More throughput
- More happy customers
- More profit

# Adding value

## to your tooling investment

Mirage, Mirage Super and Delta cutters are suitable for remanufacture. Our unique QuickEdge process can give you up to seven times extra usage out of your tooling, and with material costs continuing to increase you can't afford to ignore the benefits of remanufacture.

- Tools controlled by size, number of reissues and remanufactures
- Reduced logistics costs
- Extremely attractive price and performance over the life of the tool

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 seven remanufactures you will continue to enjoy new tool performance.

Ask  
about our  
introductory  
offer today



*Tools shown not Mirage/Mirage Super/Delta*



*To produce a precision made product is the norm  
but to produce it consistently is precise*

# 24/7 control

## of your tooling inventory

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, 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
- 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

# 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

