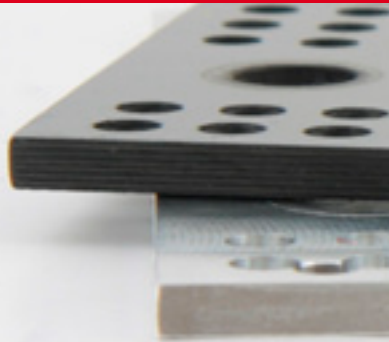


Tool solutions

Focus segments for the aerospace industry



Our introduction

OPTIMISED PRODUCTION

KYOCERA UNIMERCO Tooling A/S – your full-service tooling partner

KYOCERA UNIMERCO offers a complete tooling programme for machining aerospace metals and fibre composites. As the choice of tool is always based on a cost-benefit assessment, the solution often includes standard, customised carbide and diamond tools. This allows you to get the best total solution from one source, thus reducing your supplier base.

High performance tooling solutions

To machine a component at the lowest possible costs, you need the best possible combination of machinery, machining parameters and tooling solutions. Therefore, we analyse all aspects of the production process involving cutting tools and systematically optimise them. Subsequently, our tool developers define the optimum tooling solution customised to fit your requirements. Often, we are able to implement a solution which reduces the number of tools necessary for a certain operation or simplifies the process, thus considerably reducing tooling costs and machining time.

All tools are developed and manufactured utilising the latest technology. The optimum tooling solution often includes the unique geometries developed by KYOCERA UNIMERCO which helps to ensure extreme accuracy and tight tolerances. This means that tools can be run at extremely high cutting speeds in balanced conditions utilising the full capability of machine tools and maximising metal removal rates.

RE-NEW® – regrinding and repair of all PCD tool brands

Reliable and profitable production demands professional tool maintenance. RE-NEW® is KYOCERA UNIMERCO's full-service repair and regrind service of own tools and all other tool brands. The RE-NEW® concept ensures that high productivity, function, and tool life are maintained throughout the life span of the tool – with a performance guarantee. This means that you can confidently run any RE-NEW® tool in production at full speed without compromising, as you would for competitors' re-ground tools.

We call it RE-NEW® because the tool will perform as well re-ground as it will when it is new – if not better!

Norms and ECR

– guarantee of identical tools, whether new or RE-NEW®

All of our companies utilise integrated CAD/CAM for design and production. The solution is part of the guarantee of 100% identical design and production. All tools have been designed in accordance with our norms (a norm is an instruction that controls the geometry, measurement and manufacturing process). The norms are developed and maintained centrally and subsequently distributed to all companies in KYOCERA UNIMERCO via our central server.

For this specific purpose, the central programme database secures that all CNC-controlled machines in all our companies use the exact same machining data. All CNC machines are from the same manufacturer and are also calibrated to a master machine. Programmes are automatically deleted from each machine immediately after use.

In addition, we have created an electronic drawing database which offers version management, search options and traceability.

The results are short design times, high accuracy and repeatability and high-capacity utilisation resulting in fast deliveries. The benefit is that any tool will perform the same whether new or RE-NEW® guaranteeing you process reliability and high performance.

UM SOP™ (Systematic Optimisation of Production)

UM SOP™ is a method and optimisation tool which is applied in order to reduce your production unit costs. our sales engineers evaluate customer processes and make constructive suggestions, showing how a new process is implemented and predicting the cost savings. Over time, the optimisation data is collected and presented to senior managers to show the projects that have been optimised and the financial benefits to the company. The system maximises the efficiency of both our time – and yours. UM SOP™ is consultancy and is there to increase your productivity and ultimately increase your profits.



OPTIMISED PRODUCTION

Test facility

To stay ahead of the field, we have set up a 5-axis machining centre for performance testing of new tools using both traditional lubrication and minimum quantity lubrication (MQL). For instance, the tools are tested for function, runout accuracy, tool life, and KYOCERA UNIMERCO also establishes the optimum machining parameters for given applications.

Research and development

We believe that the way forward is investment. As well as extensive investment in plant and machinery, heavy investment is made each year in developing new tool solutions for new materials and applications. KYOCERA UNIMERCO is currently undertaking research projects with major universities around the world into cutting solutions for the latest materials, some of which are seen today as 'impossible to cut'. Working with us will give you access to the latest technology and help you increase your productivity through performance cutting solutions.

Fast delivery

The standard delivery time on solid carbide is 2-3 weeks and 4-6 weeks for PCD. A complete programme of standard mills, drills, countersinks, reamers and spindle nose tooling is available ex stock (see page 19). The manufacturing capacity in Denmark (2 sites), the UK and USA, enables us to carry out fast deliveries of tools. This means that you carry less inventory and ultimately have less cash tied up in stock.

Safety stock and tool management

If so desired by the customer, KYOCERA UNIMERCO offers to establish a safety stock for urgent deliveries. In return, the customer undertakes to buy the tools in question within a fixed period of time. In addition to this we run fully automated tool management with crib systems to larger customers with a full reporting system to help managers with financial production control.

Implementation

In our opinion, tool delivery is just part of the total solution. The most efficient production situation is achieved only if the tool is used correctly. Thus, our optimisation experts will assist during this phase with advice concerning cutting parameters, cooling, production reliability and will optimise production for you.

Why a partnership?

Long-term improvement of competitiveness demands a serious and permanent cooperation in which both parties work together to improve productivity. That is why KYOCERA UNIMERCO is the preferred tooling partner for the aerospace industry.

FOCUS SEGMENTS



CUTTING TOOLS FOR ALL MATERIALS

We specialise in the design and manufacture of cutting tools to machine all aircraft materials from the softest aluminium to the hardest nickel alloys and most abrasive CFC's.

By breaking a typical aircraft down into focus segments, KYOCERA UNIMERCO has developed the correct tool materials, geometries and coatings to optimise production solutions and improve component accuracy in all materials and applications.

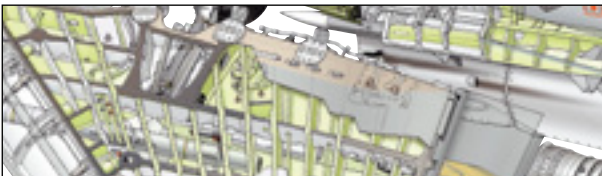
This means that all KYOCERA UNIMERCO customers can benefit from a standard or special tooling solution that is 'fit for purpose', competitively priced and delivered within a short period of time. The result is that our customers can produce higher quality components faster, which results in lower costs and a competitive edge in a difficult market.

MATERIALS

- › Light alloys
- › AlSi alloys
- › MMC's (metal matrix composites)
- › Fibre composites
- › Fibre composite/metal stacks
- › Titanium alloys
- › Nickel alloys
- › Stainless steels

SEGMENT OVERVIEW

AIRFRAME



- › One-shot drilling of CFC/metal stacks
- › Orbital drilling tools
- › One-way assembly drill/countersink tools
- › PCD and CVD diamond solutions for CFC milling and drilling
- › C7 nanocomposite coating technology for milling and drilling.

AVIONICS



- › Diamond cutting tools for high silicon alloys
- › Long-reach special tooling
- › Anti-chatter milling tools.
- › Concentrically adjusted tooling to within 1 micron t.i.f.

AEROSTRUCTURE

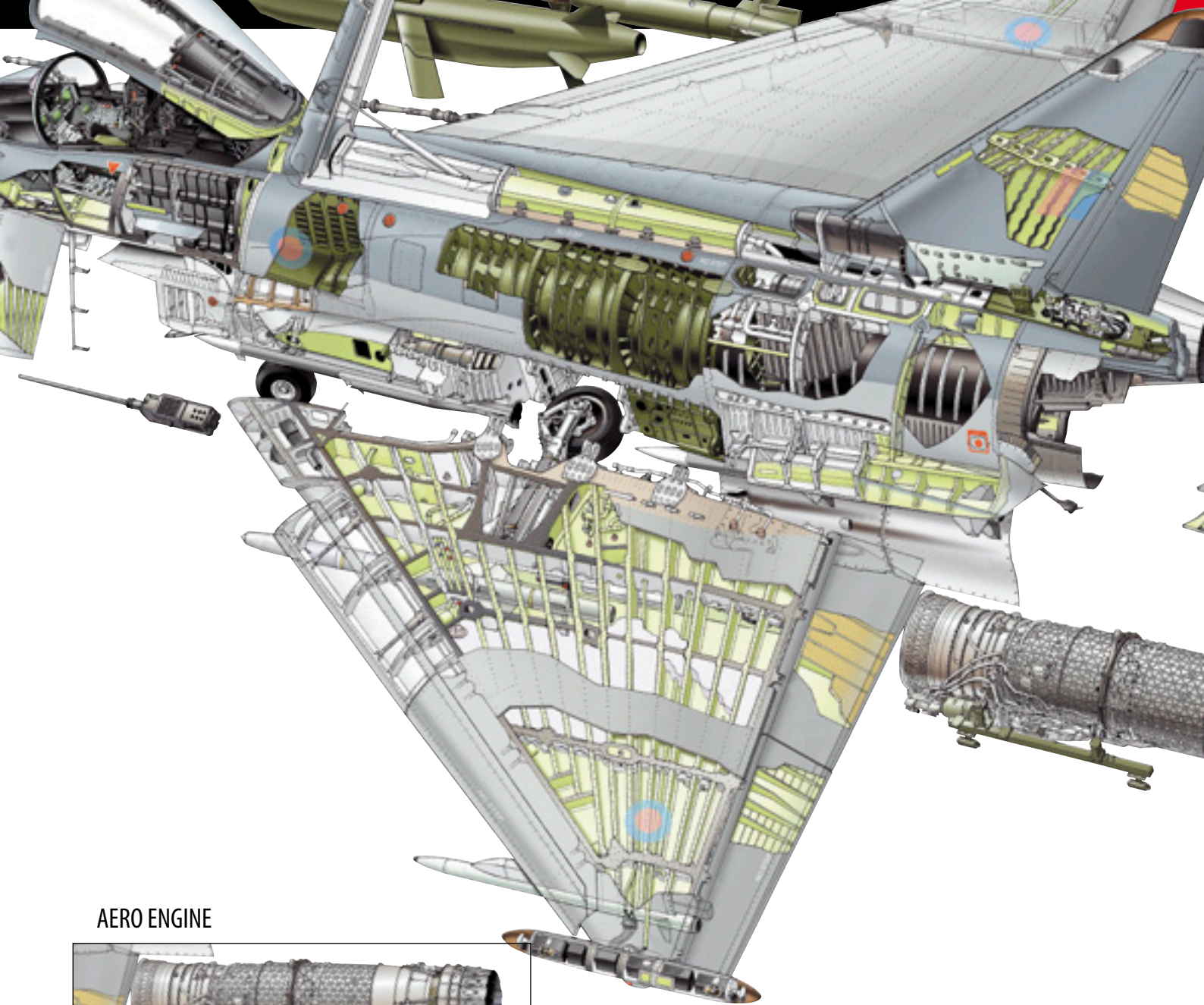


- › High performance machining of titanium and steel structures
- › High speed machining of Ti and aluminium alloys
- › Cutting tool solutions from carbide and PCD for aerostructure materials
- › C7 nanocomposite for max. performance in titanium.

CONTROL SYSTEMS



- › High accuracy solutions for hole finishing
- › Port boring tools for one-shot hole manufacturing
- › Standard and high performance drills, taps, thread mills and reamers.



AERO ENGINE



- › Blade and blisk milling cutting tools
- › Root-form tools (brazed and solid carbide)
- › Multi dia-drilling of exotic materials
- › High surface generation rate 5-axis milling solutions
- › Specialist in machining nickel alloys
- › C7 for titanium, nickel alloys and stainless steels.



AEROSTRUCTURE

INTRODUCTION

The aerospace segment covers the manufacture of machined components from light alloy ribs and spars, titanium struts and pylons through to steel landing gear components.

KYOCERA UNIMERCO specialises in standard and special tool solutions for milling and drilling structure components. From conventional machining to high speed machining of soft alloys, right through to high performance milling of hard metals, we have a solution that will **reduce** cycle times, **improve** quality and **increase** profitability.

Our technical department specialises in bespoke solutions for all sizes of component in any material. The aerospace market has moved towards monolithic structures that have thin walls and deep pockets. This is where maintaining surface finish and accuracy can cause problems with conventional tooling. Call us for the ultimate engineered solution in these applications.

TOOL EXAMPLES



DRILL

Standard and special performance drills

One-shot drill negates the need for a spotdrill, thus saving time. Through coolant to evacuate swarf from holes and aid cooling means longer tool life.

Multi-diameter h7 hole tolerance drills available upon request.



PCD ROUTER

PCD tooling for high speed milling of light alloys

High-speed milling reduces cycle times and allows for efficient machining of thin walls without chatter. Excellent surface finish can be achieved which means higher quality components.

Up to 50x tool life over solid carbide improves tool economics and reduces the number of tool changes.



STUB UM WAVE TOOL

Solid carbide tools for milling nickel alloys and titanium

Stub design tools offer high rigidity and can cope with high tooth loads so high feed rates can be used. Wave flute design stabilises chatter, allowing deeper cuts and thus increasing metal removal rates.

Cutting geometry for roughing and finishing means fewer tools and tool changes. C7 coating can significantly extend tool life and allow higher surface speeds.



LONG UM WAVE TOOL

Solid carbide performance tools for hard metals

Optimised designs for machining hard metals means that higher metal removal rates can be achieved – thus increasing productivity. Special flute design allows for very deep roughing cuts, reducing cycle times.

Cutting geometry for rough and finish machining means less tools are required – ultimately reducing costs.



COMPONENT EXAMPLES



CARBIDE ROUTER

Solid carbide performance tools for light alloys

Tough carbide grade allows for very high feed rates, thus increasing productivity. Special geometry enhances surface finishes and improves component quality.

CNC ground with 'customer-specified' flute length, reach or corner radius means the right tool for the job and optimises productivity.



PCD HSK INTEGRAL ROUTER

Integral performance PCD tooling for light alloys

Integral design with increased stiffness allows deeper cuts without chatter. Tough diamond suitable for aero alloys means that the tools last significantly longer than carbide-tipped equivalents.

Through coolant for effective chip evacuation results in no re-cutting of swarf (suitable for MQL). PCD gives a mirror finish on pocket bases.



MULTIFLUTE FINISHING TOOL

Solid carbide performance tools for high speed cutting of exotic materials

Different geometry design for different metals optimises cutting performance. Suitable for high speed machining which reduces cycle times.

Excellent surface finishes improve component quality, thus reducing post machining operations.



PCD TEE SLOT CUTTER

Special PCD tooling for difficult applications

Extremely high rigidity means that higher cutting parameters are achieved. PCD is 5 times harder than carbide which means less abrasive wear to cutting edges and it has a 6 x lower coefficient of friction to eliminate built-up edge on the tool.

We design the correct tool solution to fit the exact customers specification so that the cutting process is optimised.

AERO ENGINE

INTRODUCTION

The aero-engine segment covers the manufacture of machined engine components from titanium blades, blisks and casings through to nickel alloy 'hot end' components.

KYOCERA UNIMERCO specialises in standard and special tool solutions for milling and drilling engine components. From blade root form milling to high speed machining of blade aerofoils and snubbers, right through to high-performance milling of hard metals such as disks and shafts, we have a solution that will **reduce** cycle times, **improve** quality and **increase** profitability.

Our technical department specialises in bespoke solutions for all sizes of component in any material. The market has moved towards blisks with longer, thinner blades and is investigating materials such as gamma titanium aluminide. This is where maintaining surface finish and accuracy can cause problems with conventional tooling. Call us for the ultimate engineered solution in these applications.

TOOL EXAMPLES



STUB DRILL COATED

Special drills for optimum performance on casings and rings

Bespoke designs give the exact tool for the job so productivity and accuracy is maximised.

Choice of point types and flute configurations to give the best quality hole and consistency which reduces non-conformance.

Through coolant chills the tool/chip interface and extends tool life.



MULTI DIAMETER DRILL

Step drills to increase accuracy and minimise tool change

Multi-diameter drills to reduce 3 or 4 tools down to 1! One shot h7 drill/chamfer tools reduce cycle time significantly thus freeing up machine capacity.

Different coatings are available for drilling different metals to increase tool life and reduce tool costs. Full RE•NEW® (regrind/recoat) with 'as new' guarantee means that tools perform consistently, this reduces cycle costs whilst giving confidence in production.



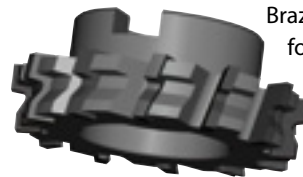
BACK CHAMFER/FORM TOOL

Back chamfer tools

Single flute tools to chamfer the back of holes, made from brazed carbide, solid carbide and PCD.

The result is the reduction in process time from reducing the number of operations.

Simply feed through the hole, move to centre, start the spindle and feed to produce the feature – effortless and in a controlled process.



ROOT FORM CUTTER

Brazed and solid carbide root form cutters

Brazed carbide and solid carbide root form cutters CNC ground to achieve high accuracy and repeatability. Shank or bore tool designs to suit customer specific applications mean that highest MMR is achieved.

Controlled grinding process ensures that we can guarantee the root form and the customer benefits from increased confidence and process reliability.



COMPONENT EXAMPLES



BALLNOSE LOLLIPOP AND BARREL CARBIDE CUTTERS

Ballnose lollipop cutters and barrel mills

Lollipop cutters reach difficult areas allowing some 5-axis work to be achievable on a 3 axis machine. Any shape of tool can be manufactured with geometry to suit specific metals, which enables high efficiency.

Increasing the radius to a barrel shape increases the step over dimension when milling 3D surfaces, and significantly reduces cycle times.



TORUS CUTTER CARBIDE

Torus milling tool

Our special design allows high MRR's and feed rates giving high productivity.

Controlled RE•NEW® (re-grinding and re-coating) with guaranteed performance means that this tool works the same whether new or RE•NEW®, giving a stable manufacturing process. Surface coating facilities at all KYOCERA UNIMERCO manufacturing sites means that all tool manufacturing processes are controlled in-house which gives the customer confidence in quality and delivery.



TAPER BALLNOSE CUTTER CARBIDE

Taper ballnose cutter

Bespoke stub flute design tools offer high rigidity and can cope with higher tooth loads so high feed rates can be used. Special flute designs stabilise chatter allowing faster feeds and thus increasing surface generation rates. Suitable for all blade and blisk applications.



STUB UM WAVE TOOL

Solid carbide tools for milling nickel alloys and titanium

Stub design tools offer high rigidity and can cope with high tooth loads so high feed rates can be used. Wave flute design stabilises chatter allowing deeper cuts and thus increasing metal removal rates.

Cutting geometry for roughing and finishing means fewer tools and tool changes – excellent for scallop milling applications. C7 coating can significantly extend tool life and allow higher surface speeds.

AVIONICS AND MISSILES

INTRODUCTION

The avionics and missiles segment covers the manufacture of machined components from light alloy castings and titanium brackets, through to metal matrix composites and 60% silicon aluminium alloys.

KYOCERA UNIMERCO specialises in standard and special tool solutions for milling and drilling engine components. From blade root form milling to high speed machining of blade aerofoils and snubbers, right through to high-performance milling of hard metals such as disks and shafts, we have a solution that will **reduce** cycle times, **improve** quality and **increase** profitability.

Our technical department specialises in bespoke solutions for all sizes of component in any material. The market has moved towards blisks with longer, thinner blades and is investigating materials such as gamma titanium aluminide. This is where maintaining surface finish and accuracy can cause problems with conventional tooling. Call us for the ultimate engineered solution in these applications.

TOOL EXAMPLES



PCD TWIN POINT DRILL

PCD twin point drill

Twin point allows higher feed rates and increases productivity.

No single point at centre means lower forces and less damage to components.

PCD edges give significant increases in tool life and reduce the manufacturing cost per hole.



CARBIDE CUTTER

Solid carbide performance tools for light alloys

Tough carbide grade allows for very high feed rates thus increasing productivity.

Special geometry enhances surface finishes and improves component quality.

CNC ground with any flute length, reach or corner radius means that customer specifies the right tool for the job and optimises productivity.



BALLNOSE LOLLIPOP CARBIDE CUTTER

Ballnose lollipop cutters

Lollipop cutters reach difficult areas allowing some 5-axis work to be achievable on a 3-axis machine. Any shape of tool can be manufactured with geometry to suit specific metals which enabled high efficiency.

Long reach tools allow for machining in extremely difficult areas which reduces extra set ups and post machining operations such as hand benching.



PCD ROUTER

PCD tooling for high speed milling of light alloys

High-speed milling reduces cycle times and allows for efficient machining of thin walls without chatter. Excellent surface finishes can be achieved which means better quality components.

Up to 50 × tool life over solid carbide improves tool economics and reduces the number of tool changes.



COMPONENT EXAMPLES



CARBIDE LONG SERIES DRILLS

Extra long and specials drills

We specialise in manufacturing accurate long series drills which means good hole quality – consistently. Special multi-diameter drills to cut any material are designed and manufactured in-house taking the problem away from the customer and releasing time.

HSS, carbide and PCD with a choice of coatings including CVD diamond means that we can offer a solution to the most problematic holes.



PCD INTEGRAL FACEMILL

PCD facemills with fixed or changeable inserts

Integral design or bore/spigot and the correct geometry allows for deeper cuts at high speeds. Tough diamond suitable for aero alloys means that the tools last longer and produces 'mirror finishes'.

Through coolant for effective chip evacuation means no re-cutting of swarf (suitable for MQL). Available as shown with brazed inserts or with replaceable cartridges to suit all applications.



PCD FORM ROUTER

CD special tooling for high speed milling

High-speed milling reduces cycle times. Excellent surface finishes means better quality components.

Up to 50 x tool life over solid carbide means that very long scanning cycles can be used with only one tool and 'mirror finishes' are achieved on components.



UM WAVE

Solid carbide UM wave tools for hard metals

Optimised designs for machining hard metals means that metal removal rates can be increased. Special flute design allows for very deep roughing cuts reducing cycle times.

Cutting geometry for roughing and finishing means less tools are required – ultimately reducing costs. Available with C7 nanocomposite or CVD diamond coating to extend tool life.

◀ 'Barrel-end geometry' for surface machining

CONTROL SYSTEMS

INTRODUCTION

The control systems segment covers the manufacture of machined components from light alloy and titanium hydraulic control boxes through to stainless steel barrels with close tolerance bores.

KYOCERA UNIMERCO specialises in standard and special tool solutions for milling and drilling these components. From conventional machining to high-speed machining of soft alloys and titanium, right through to high accuracy, multi-diameter drill/ream/port boring applications, we have a solution that will **reduce** cycle times, **improve** quality and **increase** profitability.

UNIMERCO's technical department specialises in bespoke solutions for all sizes of component in any material. The market has moved towards more complex components with very deep holes and complex port features that are designed with tighter tolerances than ever before. This is where maintaining surface finish and accuracy can cause problems with conventional techniques. Call us for the ultimate engineered solution in these applications.

TOOL EXAMPLES



BACK CHAMFER/FORM TOOL

Back chamfer tools

Single-flute tools to chamfer the back of holes, made from brazed carbide, solid carbide and PCD.

The result is the reduction in process time from reducing the number of operations.

Simply feed through the hole, move to centre, start the spindle and feed to produce the feature – effortless and in a controlled process.



CORE/CHAMFER/COUNTERBORE

Multi diameter core/step drills and reamers

KYOCERA UNIMERCO specialises in manufacturing accurate multi-diameter drills and reamers which means good hole quality – consistently. Special tools to cut any material are designed and manufactured in-house taking the responsibility away from the customer and releasing engineering time.

HSS, carbide and PCD with a choice of coatings including CVD diamond means that we can offer a solution to the most problematic holes.



LONG UM WAVE TOOL

Solid carbide performance tools for hard metals

Optimised designs for machining hard metals means that higher metal removal rates can be achieved – thus increasing productivity. Special flute design allows for very deep roughing cuts, reducing cycle times.

Cutting geometry for rough and finish machining means less tools are required – ultimately reducing costs.

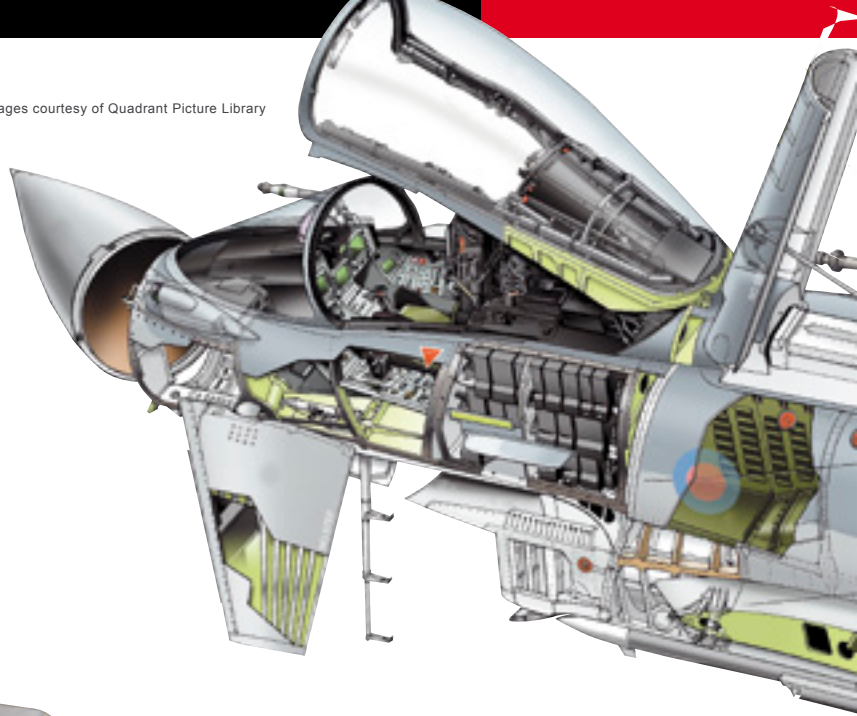


CARBIDE ROUTER

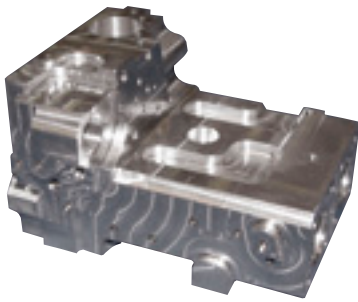
Solid carbide performance tools for light alloys

Tough carbide grade allows for very high feed rates, thus increasing productivity. Special geometry enhances surface finishes and improves component quality.

CNC ground with 'customer-specified' flute length, reach or corner radius means the right tool for the job and optimises productivity.



COMPONENT EXAMPLES



STEPDRILL/FORM SPOTFACE TOOL CARBIDE

Drill/c'bore/spotface form tool

This tool reduces 4 individual tools down to 1 tool. The result is significantly lower cycle time and improved productivity.

Only one toolholder is required, saving money on holders and freeing capacity in the tool carousel. (See our range of toolholders on page 19).



TEE SLOT UNDERCUT TOOL

Tee slot cutter

Available from HSS, carbide and PCD, we offer solutions for all materials. Long-reach solutions are available making the most difficult applications less problematic.

Straight or staggered flute designs to suit individual applications allow maximum MRR and increase productivity.



STEPDRILL/CHAMFER TOOL CARBIDE

Carbide and PCD drill/chamfer tools

One shot h7 drill/chamfer tools reduce cycle time significantly thus freeing up machine capacity.

Different coatings are available for drilling different metals to increase tool life and reduce tool costs.

Full RE-NEW® (regrind/recoat) with 'as new' guarantee means that tools perform consistently, this reduces cycle costs and maintains confidence in production.



UNDERCUT O-RING GROOVE/FORM TOOL

Undercut/grooving tools

Extremely complex tools with many different features significantly reduce the number of tools required in a process. Special geometry enhances surface finishes and improves component quality in critical areas.

Accurately CNC-ground to any profile shape means that the correct size and form is produced on the component, giving consistency between batches and eliminating the risks involved with setting multiple tools.

AIRFRAME

INTRODUCTION

The airframe segment covers the drilling, surface machining and trimming of composite components and the assembly machining of composites and stack materials such as CFC/AL and CFC/titanium, one way assembly tools and orbital drilling tools.

KYOCERA UNIMERCO specialises in standard and special tool solutions for milling and drilling airframe components. From trimming CFC's to one shot drilling of carbon fibre stacks with Cpk's of >3.5, we have a solution that will **reduce** cycle times, **improve** quality and **increase** profitability.

Our technical department specialises in bespoke solutions for all sizes of component in any material. The market has moved towards composite structures that have thicker sections and include hard metals in places. This is where maintaining tool life and hole accuracy can cause problems with conventional methods. Call us for the ultimate engineered solution in these applications.

TOOL EXAMPLES



PCD FORM ROUTER

PCD special tooling for high-speed milling

High-speed milling reduces cycle times. Excellent surface finishes means better quality components.

Up to 50 x tool life over solid carbide means very long scanning cycles can be used with only one tool and 'mirror finishes' are achieved on components.



UP/DOWN/CUTTER

Carbide and PCD up/down cutter

High-speed milling reduces cycle times and allows for efficient machining of thin components without chatter.

Excellent surface finishes can be achieved which means better quality components. The up/down geometry holds thin components steady, reducing vibration – this increases tool life and component quality.



REAMERS/C'SINK TOOL BRAZED CARBIDE ON STEEL BODY

Brazed carbide drill/c'sink tools

Specifically designed for large hole applications where the drill dia is >15mm.

One shot drilling, core drilling or reaming means less tools are used and cycle times are reduced.

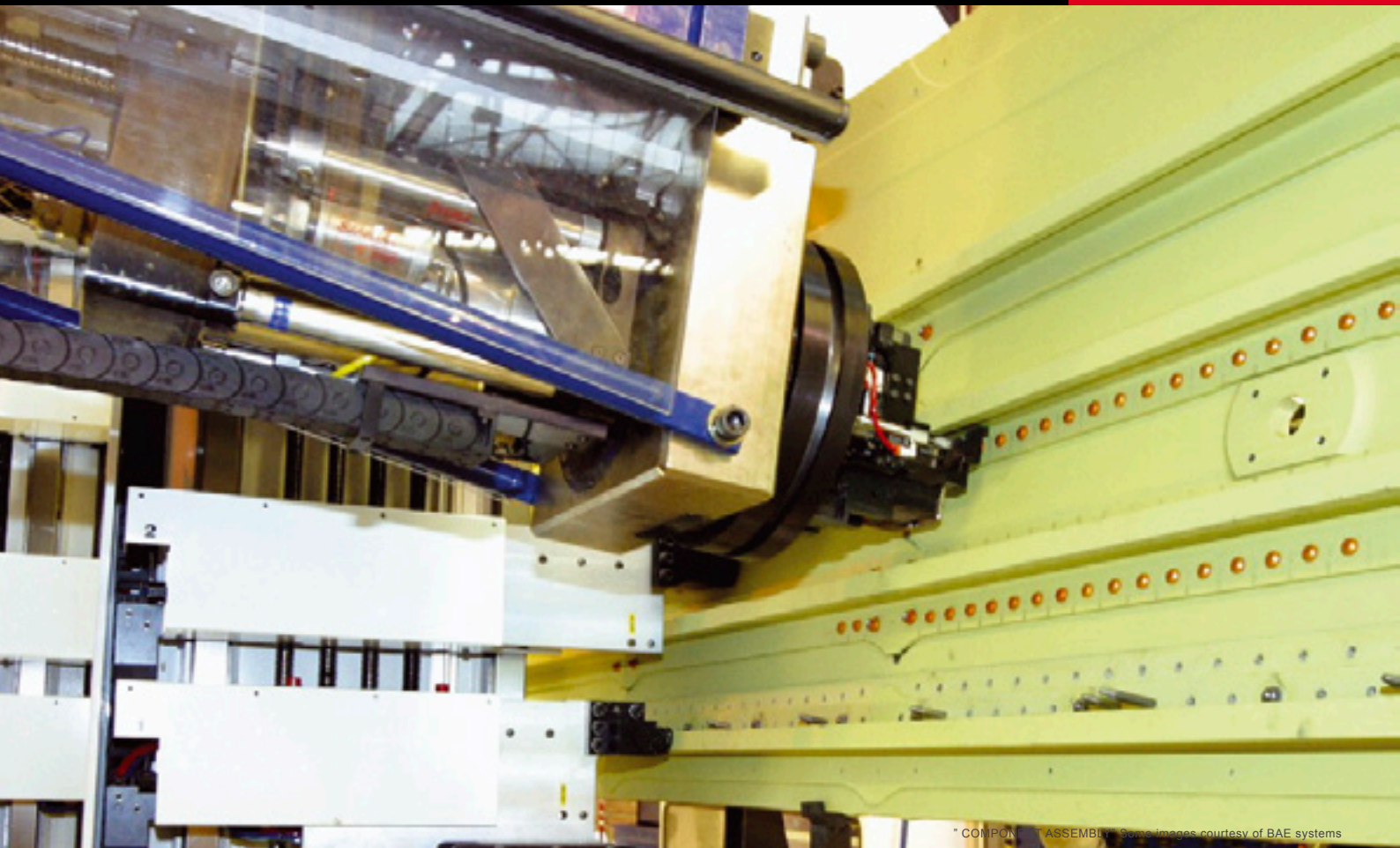
Brazed carbide CSK design is highly cost effective in hole diameters >15mm compared to solid carbide tools.



PCD HSK INTEGRAL ROUTER

Integral performance PCD tooling for light alloys

Integral design with increased stiffness allows deeper cuts without chatter. Tough diamond suitable for composite skin milling allows skin profiles to be machined with minimum tool wear. This reduces the cost per cut and maintains component accuracy.



* COMPONENT ASSEMBLY. Some images courtesy of BAE systems



C7 NANO-COMPOSITE AND CVD DIAMOND COATED DRILLS

Coated drills

High-performance drilling of CFC materials reduces cycle times in CNC or power feed applications. Increased life reduces the tools costs per hole.

As an alternative to PCD, C7 or CVD diamond coating can be applied to tools with any geometry thus allowing optimised tool designs. C7 is regrindable and may offer lower life cycle costs than CVD diamond tools.



CVD DIAMOND, PCD AND CARBIDE ORBITAL DRILLING TOOL

Orbital drilling tools

Orbital drilling is new technology for airframe hole production.

With each application totally different, KYOCERA UNIMERCO has tool solutions to suit your needs.

Carbide, C7 or diamond coated and PCD tool options are designed to offer process reliability and high accuracy.



VEINED PCD DRILL/C'SINK TOOL

Veined PCD drill c'sink tools

Veined PCD is where diamond is 'grown' into helical-geometry tools. A variety of forms of drill c'sink tools are available to increase productivity and hole quality.

The exact geometry can be applied directly to diamond, thus giving the best tool for CFC drilling. Regrindable up to 3 times – improves economics. h8 one-shot drilling applications reduce the need for multiple tools.



VEINED PCD DRILL/ C'BORE PORTABLE DRILL UNITS

Veined PCD multi diameter drills

Veined PCD offers 30 x life over uncoated carbide in abrasive applications.

A sharper edge than CVD diamond and renewable means that cost per hole can be reduced significantly in CNC applications.

Veined PCD allows carbide geometry to be applied to diamond, giving a clean effectively cutting action and achieving high accuracy.

CASE STORY

POCKET MILLING AIRFRAME COMPONENT

The airframe segment covers the drilling, surface machining and trimming of composite components and the assembly machining of composites and stack materials such as CFC/AL and CFC/titanium, one way assembly tools and orbital drilling tools.

KYOCERA UNIMERCO specialises in standard and special tool solutions for milling and drilling airframe components. From trimming CFC's to one shot drilling of carbon fibre stacks with Cpk's of >3.5, We have a solution that will **reduce** cycle times, **improve** quality and **increase** profitability.

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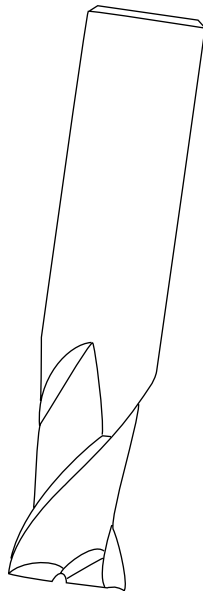
OLD METHOD

3 cuts:

Rough: 9,000 rpm and 500mm/min – 5mm deep
Semi finish: 9,000 rpm and 500mm/min – 1mm radial
Finish: 9,000 rpm and 500mm/min – 0.1mm radial

Cycle time = 9.2 min

Standard solid carbide router



NEW METHOD

1 cut:

Rough and finish: 18,000 rpm and 3,600mm/min – 5mm deep

Cycle time = 1.1 min

UNIMERCO PCD router



CYCLE TIME REDUCED BY 88%

CASE STORY

POCKET AND SLOT MILLING TITANIUM FORGING

High-performance roughing of titanium using UM wave.
This optimisation was conducted to increase productivity whilst rough milling titanium.

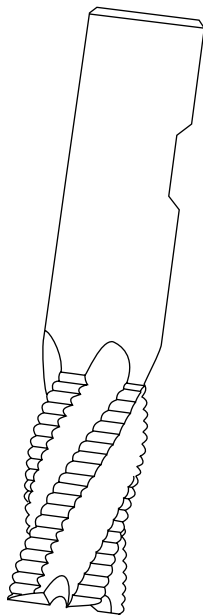
The current benchmark was a 0.5xD deep slotting cut using a HSSCo TiCN coated ripper. The UM wave cutter with C7 coating is designed for high performance, deep slot milling of exotic alloys. Using this tool the depth of cut was doubled to 1xD while at the same time the cutting speed was doubled.

UM wave can also be used for finish machining which negates the need for separate roughing and finishing tools.

OLD METHOD

10mm deep × 20mm wide cut
30m/min at 0.08mm feed/tooth

**Coated HSSCo
ripper**



NEW METHOD

20mm deep × 20mm wide cut
60m/min at 0.08 feed/tooth

**C7 coated
UM wave**



TWICE DEPTH AND TWICE SPEED = PRODUCTIVITY INCREASE OF 400%

CASE STORY

ASSEMBLY DRILLING OF AIRCRAFT SKIN

One shot drilling of CFC/aluminium stack

The objective in this application was to reduce costs.

The current process utilised a competitors PCD drill and PCD reamer. The total cost per hole was significant but only PCD was capable of cutting this type of material. Our solution utilised veined PCD which allows 'carbide-style' geometry to be applied to diamond (PCD). The result was a significant reduction in hole costs and a very high process capability.

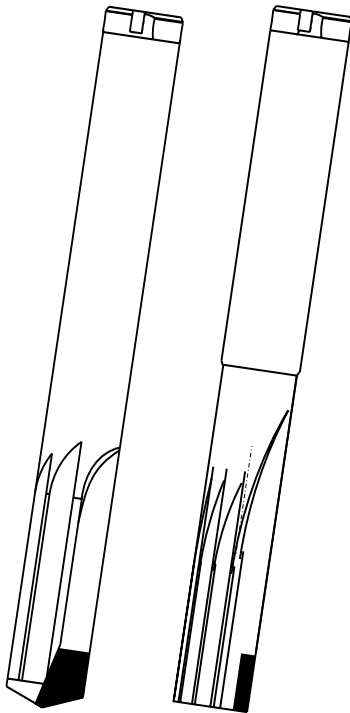
Veined PCD is used across the aerospace and formula 1 industries and is particularly effective in highly abrasive applications.

OLD METHOD

2 shot solution – drill and ream:

Cost/hole = £ 1.67

Brazed PCD drill
and reamer



NEW METHOD

1 shot hole with >3.5 Cpk:

Cost/hole = £ 0.36

Veined PCD
One shot drill



HOLE COST REDUCED BY 78%

STANDARD PROGRAMME

INTRODUCTION TO THE UM CATALOGUE

Catalogue structure

KYOCERA UNIMERCO's core business is the manufacture and RE-NEW® of special tools to optimise customers production. In addition to this, we offer a complete tooling programme. This is available in the UM catalogue.

The catalogue is based on the UM CONCEPT™ and includes a number of products and services aiming at reducing unit costs and improving competitiveness.

The catalogue is user-friendly and symbols have been used extensively to explain tool properties. All necessary information on recommended cutting data and material classes has also been included on the pages, where relevant.

We have aimed at making the catalogue as easy to use as possible but choice of tool and cutting data will always depend on the specific situation.

Please contact one of our technical sales engineers who will help you choose the right tools and optimum cutting parameters.

CHAPTERS OVERVIEW



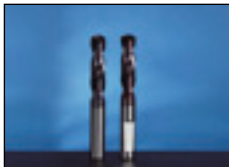
Milling

- › HSS and HSS PM end mills
- › Standard and high performance carbide end mills
- › Customised milling cutters



Surface coating

- › Tribology centre
- › Coating of cutting tools
- › Coating of non-cutting tools



Drilling

- › High performance carbide twist drills
- › High performance carbide straight flute drills
- › High performance carbide three flute drills



Toolholding systems

- › Complete toolholding programme
- › Collet chucks/hydraulic chucks/shrink fits
- › Systems from Nikken and Schunk



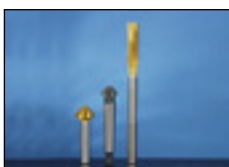
Thread cutting tools

- › HSS and HSS PM taps
- › HSS fluteless taps
- › Thread milling cutters
- › Dies



Tool maintenance

- › RE-NEW® carbide tools
- › RE-NEW® and re-tip PCD tools
- › RE-NEW® veined PCD tools



Countersinks and reamers

- › HSS countersinks
- › Carbide countersinks
- › HSS reamers
- › Carbide reamers



Tool management

- › Tool lockers
- › AutoCrib dispensing stations
- › UNI•SERVICE



Diamond tools

- › PCD milling cutters
- › PCD drills
- › PCD special tools



Training and education

- › Standard courses
- › Special courses
- › Production analysis
- › Theme days

KYOCERA UNIMERCO Tooling A/S

KYOCERA UNIMERCO manufactures, distributes and services tools for machining, as well as measuring equipment for the manufacturing industry. The tooling concept comprises standard and customised tools, RE-NEW® tool maintenance, coating and optimisation guidance. The Danish company was established in 1964 and has product development, production, sales and service in the corporate headquarters, located in Sunds.

The company is part of the KYOCERA UNIMERCO group, founded in Denmark in 1964 and originally named UNIMERCO. In 2011, all activities were acquired by Japan-based KYOCERA. This has created an even stronger company with a larger range of products, a wide network of companies and distributors all over the world, and an ambitious growth plan.



KYOCERA UNIMERCO Tooling A/S

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