Machine tools that make the difference in the Aerospace sector
GF AgieCharmilles is a leading supplier of machine tools to the Aerospace Industry and is increasingly a supplier of choice to precision aircraft component manufacturers around the world. Our machine tool technology solutions are used (and specified) by a growing number of aerospace manufacturers and are renowned for their productivity, accuracy and reliability.

GF AgieCharmilles is a total systems solutions provider, able to supply aerospace manufacturers with a comprehensive range of best-in-class machine tools (High-Speed and High-Performance 3-, 4- and 5-axis machining centres, wire and spark erosion EDM machines), application expertise, automation and workholding solutions and, of course, world-class after-sales services.

The following provides a brief overview of what GF AgieCharmilles aerospace customers manufacture with our machine tools:
- Wing sections
- Ribs
- Bulkheads
- Spars
- Floors
- Seat tracks
- Brackets and fasteners
- Aero-Engine components
- Cowlings, housings and covers
- Landing gear components
- Pneumatic and hydraulic valves and actuators.

In this brochure we take a closer look at just a sample of our machine tools that are helping customers compete and win in the aerospace sector.

To find out more information about these machines and others in our range - contact GF AgieCharmilles on 02476 538666 or visit our website www.gfac.com/uk

FACT
GF AgieCharmilles aerospace customers include many market-leading OEMs and Tier 1 suppliers (i.e. Rolls Royce; BAE Systems; Thales; Aero Engine Controls; Lufthansa; Martin Baker Aircraft etc).
GF AgieCharmilles Mikron 5-axis machining centres are the Number One Choice for precision manufacturers operating in the aerospace sector.

Our ranges of Standard, High-Performance (HPM) and High-Speed (HSM) machines are used to manufacture high-precision, complex aerospace parts from a diverse range of materials - (Aluminium, Titanium, Inconel, Exotics etc). The breadth and depth of our 5-axis machine tool line-up is second to none - and the 3 machines featured provide a snapshot of our best-selling models over the last 12 months.

**HPM 800U**
- X, Y, Z travels: 800 x 800 x 550mm
- Spindle: 15,000/20,000/30,000rpm
- Rapid traverse rate: 45m/min
- Control: Heidenhain iTNC 530
- Clamping surface: Ø 630mm
- Table load: 500kg
- ATC: 30-210 position

The large HPM 800U (High-Performance) is a powerful, versatile 5-axis machining centre. The machine is equipped with Steptec direct-drive, in-line motor spindle technology that optimises the HPM cutting process. The machines spindle interfaces with a diverse range of toolholders (ISO, HSK) and different spindle speeds are available ranging from 15,000 to 30,000 rpm.

**HSM 400U**
- X, Y, Z travels: 400 x 240 x 350mm
- Spindle: 30,000/40,000/54,000rpm
- Rapid traverse rate: 42m/min
- Control: Heidenhain iTNC 530
- Clamping surface: Ø 156mm
- Table load: 25kg
- ATC: 18-308 position

The HSM 400U is a high-speed 5-axis machining centre that is fast, accurate and incredibly popular with aerospace precision component manufacturers. Part of GF AgieCharmilles family of high-speed and ultra high-speed machines, which also includes a new Linear Drive range of models and

**UCP 600 VARIO**
- X, Y, Z travels: 600 x 450 x 450mm
- Spindle: 12,000/20,000rpm
- Rapid traverse rate: 22m/min
- Control: Heidenhain iTNC 530
- Clamping surface: Ø 450mm
- Table load: 200kg
- ATC: 30-220 position

The UCP 600 Vario 5-axis machine is designed for production and is equipped with an integrated 7- or 10-station automatic pallet changer. The machines configuration enables customers to benefit from all the advantages of 5-axis positional one-hit machining i.e. reduced set-ups; reduced workholding;
### FACT

40% of all GF AgieCharmilles 5-axis machine tool sales in the UK in 2009 were into the aerospace supply chain.

<table>
<thead>
<tr>
<th>Improved part quality; improved cycle times etc. – but with the added advantage of being able to run unattended and unmanned, virtually around the clock... thanks to its pallet changer and large (up to 220-position) tool changer.</th>
<th>SMART technology software for increased process reliability.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Vario is equipped with the latest, high-torque spindle technology from 15,000rpm to 30,000rpm.</td>
<td>The machine has been designed with automation in mind and can be supplied with different table options (single or twin), or a 7-, 9- or 12-position APC depending on requirements. And integrated SMART Technology software helps optimise the 5-axis machining process.</td>
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<td>The HPM 800U is equipped with rotary direct drive technology. This innovation gives faster and more responsive acceleration/deceleration – and helps minimise the effects of backlash, providing users with higher productivity; improved accuracy repeatability and surface finish, and increased process reliability.</td>
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<td>Specialist production-led models for medical and dental component manufacture, the HSM 400U is equipped with an advanced (high-speed) spindle (featuring the thermally-stable OPTICOOL technology). The machine is also equipped with direct-drive rotary tables, integrated automation and</td>
<td>The HSM 400U also features a polymer concrete construction for increased rigidity and thermal stability, and the 5-axis industry-standard Heidenhain iTNC 530 control.</td>
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With some 21 different wire EDM machine models to choose from - GF AgieCharmilles wire range is second to none. From machines designed specifically for micro-machining and high-speed machining - right through to ultra-high precision, general purpose and standard-entry machines - the possibilities are endless. The 2 machines featured below represent the best selling models into the aerospace sector over the last 18 months.

<table>
<thead>
<tr>
<th>Machine</th>
<th>X, Y, Z travels</th>
<th>Max. workpiece dimensions</th>
<th>Max. workpiece weight</th>
<th>Wire diameter</th>
<th>Max taper</th>
<th>Feature</th>
</tr>
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<tbody>
<tr>
<td>CUT 30P</td>
<td>600 x 400 x 350mm</td>
<td>1,050 x 800 x 350mm</td>
<td>1,000kg</td>
<td>0.15 – 0.30mm</td>
<td>25° to 80mm</td>
<td>Automatic wire thread</td>
</tr>
<tr>
<td>FI 440CCS</td>
<td>550 x 350 x 400mm</td>
<td>1,200 x 700 x 400mm</td>
<td>1,500kg</td>
<td>0.33 - 0.10mm</td>
<td>30° to 400mm</td>
<td>CleanCut generator</td>
</tr>
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</table>

The large, class-leading and ultra-versatile CUT 30P wire EDM machine, along with the smaller CUT 20P machine, have proved ever popular with precision manufacturers since their launch in 2007. Able to handle workpieces up to 1,050mm x 800mm x 350mm in dimension and up to 1,000kg in weight.

The FI 440CCS wire EDM machine, equipped with GF AgieCharmilles state-of-the-art CleanCut digital generator technology, is fast, efficient and incredibly productive. The machines generator technology, which meets stringent NADCAP quality requirements, means that customers can achieve excellent surface finishes (less than Ra 0.1µm) when machining a variety of materials.
FACT

GF AgieCharmilles CleanCut generators eliminate the re-cast layer and ensure high surface integrity when machining Titanium and other exotics.

weight, the CUT 30P delivers exceptional performance (surface finish Ra 0.25µm and 300mm²/min cutting speeds). Features that include GF AgieCharmilles Automatic Wire Thread capability and Integrated Collision Protection on the machines Z-axis, all help boost the CUT 30P’s productivity and process reliability.

The machines unmanned operation potential is further enhanced by its large wire spool facility (16 - 25kg capacity).

materials, including titanium and titanium-alloys...and part accuracies of +/- 10 microns are well within the machines range.

Other machine features such as Automatic Wire Thread and Integrated Collision Protection capabilities ensure productivity and proven process reliability. Machining speeds (up to 400mm²/min), removal rates and overall manufacturing flexibility are optimised by the machines ability to use different diameter wires. For fast rough cutting operations 0.33mm diameter brass wires (employing GF Agie Charmilles ECONOTEC technology) deliver impressive and highly economic results, whereas for the machining of micro-features the FI 440CCS can be fitted with super-fine diameter wires of 70 microns.
With some 19 different spark erosion machines in our range - we know that we have an EDM solution for every application. Machines designed specifically for micro-machining and for delivering super-fine surface finishes along with high-speed, general purpose and standard-entry models complete the line-up. The 2 spark erosion machines featured have made a big impression in the aerospace sector since their introduction into the UK.

- **X, Y, Z travels:** 600 x 400 x 450mm
- **Max. workpiece dimensions:** 1,200 x 850 x 400mm
- **Max. workpiece weight:** 1,600kg
- **Surface finish (Ra):** 0.1µm
- **Linear glass scales**
- **IQ technology**

The high-performance C-frame FO 550SP die-sink EDM machine is without equal. The machine features fast Z-axis movement and high acceleration rates which help significantly reduce cycle times - a definite advantage when machining high-precision, complex details like deep ribs and stepped.

- **X, Y, Z travels:** 600 x 400 x 400mm
- **Max. workpiece dimensions:** 1,000 x 700 x 400mm
- **Max. workpiece weight:** 1,000kg
- **Surface finish (Ra):** 0.2µm
- **Low power consumption**
- **Plug & play capability**

The FORM 30 machine delivers exceptional performance at a more than competitive price. FORM 30 machines are rigid and thermally stable ensuring high accuracy and reliability. They are also incredibly flexible and sophisticated, and have a CNC controlled C-axis integrated into the quill of the Z-axis allowing simultaneous 4-axis interpolation,
GF AgieCharmilles EDM machines equipped with IQ Technology won MWP’s Best Specialised Machine/Manufacturing Equipment Award in 2010.

The machine is simple and straightforward to use ensuring trouble-free job set-up, and constant real-time monitoring, evaluation and re-calibration of spark gap conditions, achieved via the machines sophisticated DPC Control system, resulting in increased process optimisation and reliability.

which means that curved recesses and undercuts can be easily achieved.

The FORM 30 machines are high efficiency machines (power consumption of just 3.7kW/hour at full power) which ensures low running costs. Productivity is also a main benefit of the machines delivered by the following features:

- integrated (6-position) electrode changer to maximize unmanned operations
- simple, easy-to-use control system including AEP (Automatic Erosion Programming) capability for fast set-ups and process reliability
- dynamic digital generators allowing real-time spark gap monitoring.

workpieces. High accuracy and exceptional surface finishes are second nature to these machines - and the availability of GF AgieCharmilles IQ (Zero Electrode Wear) Technology on the FO 550SP makes it even more attractive from both an operational and commercial perspective.
Get on-board with our latest technology developments
Whether its our 5-axis machining centres or our EDM machines (or both), aerospace component manufacturers can be confident that GF AgieCharmilles machine tools will help their productivity and performance take-off.

For more information on our range of machines visit our website www.gfac.com/uk

**FACT**

By integrating automation (workpiece pallet changers, robots etc.) on GF AgieCharmilles EDM and 5-axis machine tools - customers can achieve up to 40% increases in productivity levels.

**Mikron 5-axis Milling Technology**

Our standard, High-Performance (HPM) and High-Speed (HSM) 5-axis machines are setting new benchmarks for speed, accuracy and process reliability. If and when you are considering your next 5-axis machine tool investment be sure to find out more about the following 5-axis machine tool features that separate and differentiate Mikron machines from the also-rans.

**EDM Technology (wire and die-sink)**

GF AgieCharmilles EDM technology is recognised throughout the world for its innovation, technical excellence, high-precision and long-lasting reliable performance.

If and when you are considering your next EDM machine tool investment be sure to find out more about the unique strengths and capabilities of our wire and spark erosion machines.
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