

UK UAS Community



By John Moreland, Secretary, UAVS

The strength of the UK UAS industry lies in its focus on integrated and sophisticated systems and in providing solutions that meet immediate and future requirements. Some of these solutions may not have the same market presence as systems from the US, but the UK UAS industry anticipates a significant change in this presence in the next decade. With its strong aerospace heritage, the UK aerospace industry has recognised supply chains and centres of excellence that UAS integrators can tap into. UAVS' membership is representative of those supply chains and the following articles demonstrate the range of expertise available to not only the UK, but the global UAS industry: from small UAS suppliers to safety assessment consultants; from commercialisation specialists to certification agencies; from advanced composite specialists to flying surfaces engineers; from autonomous software systems to propulsion system optimisers. The UK has much to offer the rest of the world.

Altran Praxis



Altran Praxis is a specialist systems and software house, focused on the engineering of systems with demanding safety, security or innovation requirements. Altran Praxis has a fundamental understanding of the demanding requirements for both software and safety in the defense and civil aerospace markets. It has a proven track record for delivering compliant systems and for achieving certification into service, whether as a specialist consortium partner or as a major subcontractor. Altran Praxis has produced the safety case on the MoD UK Watchkeeper UAV over the last 4 years on behalf of Thales the Prime Contractor. Operational safety cases have been developed for urgent operational requirement UAVs that are currently being used in Afghanistan. We are also a supplier of complex Air Traffic Management Systems, such as iFACTS for UK NATS. Altran Praxis leads the world in specific areas of advanced systems engineering and innovation, including ultra low defect software engineering, HMI design, connectivity solutions, systems and safety engineering for complex or novel systems. It offers clients a range of services including turnkey systems development, engineering support, project recovery, training and R&D. The company operates globally with active projects in the US, Asia and Europe. The headquarters of Altran Praxis are in Bath (UK) with offices in Sophia Antipolis, London, Paris, Loughborough and Bangalore. Altran Praxis is an expertise centre of Altran which employs 17,000 technical staff across the world. www.altran-praxis.com

Agent Oriented Software



Agent Oriented Software (AOS) is at the forefront of the revolutionary new field of autonomous and semi-autonomous systems. Its software provides decision-making capability that underlies autonomy. Current applications include decision support, oil production management, autonomous air and underwater vehicles, as well as advanced military simulation systems, with potential application to other industries such as intelligent motor vehicles and the financial industry. AOS's products, JACK® and C-BDI™, provide this capability and can be used in many ways: deployed on board an autonomous vehicle or an oil platform; or as part of an IT system as an intelligent assistant. Autonomous decision-making capability

lies at the heart of our products. As part of a lineage spanning nearly two decades, this technology is the culmination of a process of continuous research and development that began in the late 1980s with autonomous fault diagnosis for the Space Shuttle. AOS is a partner in the UK national autonomous UAS programme, ASTRAEA. ASTRAEA is jointly funded by industry and government agencies led by the Technology Strategy Board. The €35M second phase will commence in 2010. The ASTRAEA partners are working in collaboration with the UK Civil Aviation Authority on the means to clear autonomous UAS flight in unsegregated airspace without restriction. AOS is involved in two other major UAS R&D programmes. It is a partner in the Systems Engineering for Autonomous Systems Defence Technology Centre (SEAS DTC), and leads a programme into how to incrementally clear autonomous software systems as part of the UK Ministry of Defence's Software Systems Engineering Initiative (SSEI). www.aosgrp.co.uk

BAE Systems



Over the past 10 years, BAE Systems in the UK have developed a series of Unmanned Aircraft Systems (UAS) harnessing world leading autonomous technologies. These technologies have contributed to the creation of a family of UAS platforms and systems across the Medium Altitude, Long Endurance (MALE), Strategic and Unmanned Combat Air Vehicle (UCAV) classes. In the MALE class, the Herti UAS has been developed through the combination of high endurance airframes, with autonomous mission system elements, and with a strong focus on producing a system to meet emergent civil aviation standards for UAS. Over the past 5 years, this system has been operationally proven in a range of different environments and continues to undergo operational trials as the programme moves from development to production. Mantis is a Strategic UAS technology demonstration programme focused on meeting future deep and persistent ISTAR requirements, including a weapons capability. The programme is jointly funded by the UK MOD and UK industry. The first Mantis demonstrator system completed a series of flight trials in late 2009, achieving first flight just 19 months from initial concept launch. The Taranis UCAV technology demonstrator is a joint UK MOD/UK industry programme to develop and fly a low observable UCAV demonstrator system. The aircraft is currently in final assembly at the company's Warton facility, with ground testing and flight trials activities to follow in the near future. Alongside the Herti, Mantis and Taranis programmes, BAE Systems continues to develop new technologies and concepts supporting future growth in the UAS sector, including both military and civil applications across a wide range of roles. www.baesystems.com

Burbidge Associates



Burbidge Associates Ltd is a specialist business development and engineering support consultancy. Its consultants have been working in the aerospace and defence industry for over 25 years on projects ranging from flight control systems, torpedo launch systems, turbine engine gearing, to UAS (Unmanned Aircraft Systems). UAS industry experience includes development of actuation system concepts and winning proposals for various UA including Herti, Taranis

and Eagle Eye, integration of the FCAS (Flight Control Actuation System) for the TARANIS UAV demonstrator and independent assessment of a Light UAS developed by a UK University for maritime research. Burbidge Associates Ltd also provides strategic support to companies working in this industry in developing new markets, including market research and strategic planning, winning new business, including identifying prospects, developing concepts and business models, life-cycle costing, bid management, proposal planning and development and Red Teaming, carrying out customer liaison, including representation, customer surveys and market feedback. It is also an Independent Member of the UAVS Council. <http://uk.linkedin.com/in/colinmburbidge>

Docking Engineering



Docking Engineering has been producing high quality fabricated parts and cooling systems for motorsport and special vehicle use since 1984, with its roots in motorsport the company is based at Silverstone Circuit - the heart of British motorsport and the current home of the British Formula 1 Grand Prix. The company also produces components for a number of aviation customers: projects include unmanned aerial vehicles, aerial targets, UAV engine manufacturers, experimental light aircraft, microlights, historic aircraft restoration and even airships. Docking Engineering products are currently in use on at least seven UAV and Target aircraft systems around the world. By employing motorsport methodology to its UAV and special air vehicle projects it is able to offer customers a fast, efficient, flexible and cost effective service not always available from the mainstream aviation industry. And by using its knowledge and experience of race cars it can assist with the design and installation of the propulsion system to ensure that it is efficient, light and, above all, practical and easy to service. The company has the ability to produce a wide range of products from the simplest mounting bracket to the most complex oil tank, fuel tank, radiator or engine mounting frame; it can also supply oil and fuel transfer lines and precision machined parts. www.dockingengineering.com

EADS Defence & Security Systems UK



EADS Defence and Security Systems UK Limited (DS UK) is the UK operating company of EADS Defence and Communications Systems based in South Wales and one of the largest employers based there. As a Lead System Integrator, DS UK applies its insight, energy and experience to integrate large-scale and previously disparate systems in the most complex environments – extending the capabilities of Armed Forces, Emergency Services, Government and Critical National Infrastructure. DS UK is a leading partner in the Defence and Global Security markets and a leading UK supplier of Information Assurance services with award winning cryptographic solutions. DS UK is also a key provider of secure end-to-end communications to the MoD, providing effective support throughout the capability life-cycle. DS UK innovative approach to delivering tailored Lead Systems Integration solutions is demonstrated in its role in the MoD's Defence Information Infrastructure (Future), and Communities and Local Government's FiReControl programmes. DS UK purpose built facility is the result of significant investment and accommodates over 1000 employees. It houses an array of capabilities being implemented on programmes such as FiReControl and DII (F). It is also home to the UK branch of EADS Innovation Works, part of the group's global network of research & technology facilities, and EADS subsidiary Apsys, leader in risk & safety management. www.eadsdsuk.com

Ebeni



Ebeni is a dynamic company focused on delivering the highest

quality, innovative and value for money safety engineering services. Its core business is centered on safety and risk engineering for real world applications, regulations and research. Ebeni has a wide range of safety, systems and software engineering expertise that it believes is particularly relevant to UAS and have worked on many high profile projects in the UK and Europe, including WATCHKEEPER, ASTRAEA and various ATM related UAS Regulations looking at both Military and Civil applications and operations in non-segregated airspace. It has produced the Safety Case for the Ground Control system client server for Watchkeeper UAV, conducted detailed analysis of the safety issues facing UAS operations in all classes of airspace for military and civil aircraft on behalf of Eurocontrol and EUROCAE, and extensive experience in safety engineering, safety cases and software certification for military aircraft avionics both manned and unmanned. It also has extensive experience in safety assessment and safety cases for the civil and military Air Traffic Management environment including safety assessment of the implementation of European Community Interoperability Mandates, operational ATM concepts for example RVSM, OATA, UAS Operations, etc., Operational ATM procedures, European AIS Database and Airborne Collision Avoidance Systems (ACAS II). It is currently supporting the NATO sense and avoid system specification initiative, conducting detailed safety assessments for sense and avoid solutions, and contributing to the reviewing of new standards example STANAG 4671. www.ebeni.com

EuroUSC



European UAV Systems Centre (EuroUSC) was formed in March 2003. It is the first organisation to gain Qualified Entity status in regard to the design, construction and operational competency assessment of light Unmanned Aircraft Systems (UAS) operators and manufacturers. These assessments are accepted by the UK Civil Aviation Authority (CAA) without further investigation. EuroUSC's main objectives are the enabling of key infrastructure elements for the development of civil UAS applications. The key advance this year is the launch of the Light Unmanned Aircraft System Scheme (LUASS™) in the United Kingdom. LUASS™ is run by EuroUSC under its A8-22 approval (DAI/9932/09) from the UK Civil Aviation Authority as an EASA Qualified Entity. The Scheme is for Visual Line of Sight (VLOS) operations although beyond VLOS requiring segregated airspace has been achieved by EuroUSC. The Light UAS Scheme now adopted in the UK already provides an excellent platform for the management of the introduction of light UAS and tackles, in a cost effective way, the early stage problems faced by the light UAS industry. EuroUSC constantly updates its practices based on the most current work of the UK CAA, EASA and EUROCAE, providing an up to date practical approach. EuroUSC is currently negotiating with the insurance industry to launch the first European Light UAS Insurance Policy linked to the Light UAS Scheme. This will make insurance available to small sized businesses at a cost that is commensurate with the risks of their operations. www.eurousc.com

John Moreland Projects



John Moreland Projects is a specialist commercial exploitation consultancy providing advice and performance Business Strategy, Planning and Development; Investment Strategy and External Funding Sources; Market Identification and Exploitation; Product Design and Development and Commercialisation; Product Intellectual Property, Identification and Branding; Sales and Marketing; and Business and Product Project Management. Its experience has built up over 30 years working in the aerospace industry for many of the UK's 1st and 2nd tier systems design and manufacturing companies. The transition from manned

aerospace to unmanned occurred over the Millennium with the project management of an European Union Framework Programme 5 CRAFT Project, «AIRSCAN», looking to improve the flying and propulsion performance of a lighter-than-air Unmanned Aerial Vehicle (UAV). The Consultancy was then closely involved at the project management level in the first two ParcAberporth Aerial Unmanned Systems Events held at West Wales Airport, Aberporth, in 2004 and 2005 working closely with the Welsh Development Agency and this led on to the economic impact monitoring of the UK ASTRAEA Programme from 2006 to 2008 for and on behalf of the South East of England Development Agency (SEEDA), one of the funding partners. In the last two years it has completed two Commercial Exploitation Assessments for different UK academic institutions on UAS technologies and applications. The Consultancy also provides the manpower behind UAVS and is a key UAVS Council member. www.jmukprojects.com

Prodrive



Prodrive is synonymous with motorsport and is headquartered in Banbury, in the centre of the UK. It is experienced at manufacturing very low volume, lightweight components for harsh environments making its skills readily transferable to the aerospace and defence sectors and in particular UAS. It has a comprehensive specialist machining operation, with an extensive three, four and five axis CNC machining capability and its own advanced composites operation, producing structures and components for a number of industrial sectors. The advanced composites facility is based at Milton Keynes, has two autoclaves and manufactures all the bespoke components for its own motorsport programmes as well as for the aerospace and yachting industries. As well as its extensive manufacturing facilities, the company offers design and prototyping capabilities, backed by project management. For the aerospace industry it is already supplying precision engine and flap components and is gearing up to support the expanding UAV market with composites, electrical and engine parts. Its electrical workshop produces more than 6,500 wiring looms and harnesses per year, using procedures and components which can be transferred directly to defence and aerospace applications. A state-of-the-art test rig provides thorough testing of complete wiring looms checking every pin termination. The facility has already been viewed by a leading space company seeking a partner for ground-based wiring installations. The company also has a private facility near Warwick which is the home of its own private proving ground for automotive testing. www.prodrive.com

Unmanned Air Vehicle Security & Intelligence



Unmanned Air Vehicle Security & Intelligence (UAVSI) is a wholly owned division of Universal Target Systems Ltd (UTSL). UAVSI designs and manufactures UAVs at its factory in the South East of England. Key personnel in UAVSI have been involved in the development, manufacture, supply and support of unmanned air vehicles worldwide since 1983. UAVSI's primary product, the Vigilant®, is a lightweight, reliable, third generation, mini UAV system aimed primarily at the Military, Homeland Security, Special Forces, Emergency Services and Scientific market. Late 2009 saw the official launch to market of the Vigilant after five years of R&D. This launch was accompanied by the expansion of the UAVSI workforce and the opening of the new R&D facility in Kent in March 2010. The Vigilant is fully autonomous and single crew in operation. The Vigilant® is extremely inexpensive to operate and requires little in the way of expensive training to either operate or maintain. The Vigilant has already participated at shows or demonstrated on all four continents in 2010. Defexpo, BIA, STEL, QFS,

FIDAE and HOSDB have been a tremendous success. Further demonstrations are planned for DVD (Bedfordshire), RAF Waddington (Lincoln), FIA (Farnborough), MSPO (Poland), INDESEC (India), AAD (Capetown) and various others during 2010. UAVSI also provides a 'bespoke UAV' design and manufacture service, where any products in the UAVSI range can be modified quickly to facilitate customer specific requirements. www.uavsi.uk.com

Roke Manor Research



Roke Manor Research is behind some of the most innovative technology in the unmanned systems sector. Roke has a proven track record of working in collaboration with government agencies, consortia and industrial partners to deliver new capabilities. It is based in Hampshire, UK and employs over 450 people with an annual turnover of approximately £45 million. Roke is a consortium member of the Systems Engineering for Autonomous Systems Defence Technology Centre - this is a UK industrial consortium looking at issues relating to the adoption of autonomy within a defence context - has on offer a number of products and capabilities relevant to UAVs. These include: Miniature Radar Altimeter - this product line at less than 500cm³, some 50% the size of some traditional Radar Altimeters, frees up valuable space to maximise UAV payload and it is also the lowest priced radar altimeter on the market; Radar Cross Section Simulation software, Epsilon™ - a software tool designed to predict the Radar Cross Section (RCS) of a target directly from its geometrical description; Autoland - vision based capability to determine the position and altitude of a UAV relative to an intended landing zone, a technology that has been used to land a UAV onto a moving vehicle; Onboard Data Logging - provision of Systems to allow onboard sensor data logging; and UAV Video Analysis - system able to detect and track moving objects on the ground from full motion video taken from an air vehicle. www.roke.co.uk/unmanned-systems/

Thales



The UK Ministry of Defence's Watchkeeper UAS programme reflects Thales's world leading expertise in prime contracting, system integrating, UAS subsystem design, system architecture and interoperability. It provides unrivalled capability in Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR). To meet the fast-evolving needs of armed forces, Thales has created a system architecture design and validation platform, the Battlefield Transformation Centre. Working with customers, using powerful operational simulation tools, Thales designs systems to match specific needs and assess performance under realistic operational conditions. The Watchkeeper programme reflects Thales' world-leading expertise in prime contracting, system integrating, UAS subsystem design, system architecture and interoperability. The Watchkeeper aircraft has a unique dual payload capability, carrying a synthetic aperture radar/ground moving target indicator and either datalink relay or electro-optical/infrared sensor, with optional laser target designator, to deliver high quality image intelligence day and night and in all weather conditions. Its extended endurance provides flexibility and allows significant scope for in-mission retasking. www.thalesgroup.com