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UST-4
AUTUMN/FALL 2015:
EDITORIAL
OVERVIEW

Autopilot systems
Leading the way

Batteries and chargers
Developments in portable power

USV technology
Under the skin of surface craft

Delair DT-18
Flying beyond the line of sight

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September 2015 Issue 04 | **Dossier**

DelAir-Tech DT18

The integration of Unmanned Aerial Vehicles into civilian airspace is progressing painfully slowly as the emerging technology gradually proves itself. In this respect French company DelAir-Tech's autonomous DT18 craft is a trail-blazer since it has been approved by its country's national authority for beyond visual line of sight (BVLOS) operations.

Indeed, with this authorisation from the Direction Generale de l'Aviation Civile (DGAC), the DT18 is the only small civilian UAV in the world to be certified for BVLOS flight by a country's governing body without special restrictive conditions applied. Its complete autopilot, navigation and safety systems have been DGAC-approved, and the safety system works on a progressively escalating sequence of reliable failsafes.

Powered by an electric motor, the 2 kg DT18 has a wingspan of 1.8 m and can cruise at 50 kph with a maximum speed of 80 kph. It also has a range of 100 km and an endurance of 2 hours, and is suitable for a range of civilian surveying applications. Communications include 3G/4G, so it can be remotely accessed anywhere in the world via an internet connection.

Take-off is by hand or special launcher, while landing is autonomous, either belly (run on) landing or net capture if more appropriate. The DT18 is currently used by organisations around the globe, successfully operating in a wide range of environments spanning the likes of tropical, mountainous and desert. This fascinating craft will be the subject of an in-depth Dossier in the next issue of **Unmanned Systems Technology**.

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Rotron UAV Engines

In the automotive world, the finest hour for the Wankel-type rotary came at Le Mans in 1991 when such an engine won the gruelling twice-around-the-clock race. Since then, increasing emphasis on emissions, led by government demands, has prompted manufacturers to put enormous development effort into conventional engines. The rotary has been left out in the cold, despite its obvious benefits.

At the same time, those benefits have seen the rotary engine flourish in the world of the UAV. The rotary engine delivers a higher power-to-weight ratio compared with any other UAV-specific engine while remaining small, lightweight, reliable and with almost zero vibration. One of the leading manufacturers of such engines is UK-based Rotron, and its innovative approach to engine design is the subject of our main powertrain case study in *UST* issue 4.

Rotron offers ingenious patented rotor and water cooling systems, and fits electronic fuel injection as standard. Its state-of-the-art UAV engine delivers noteworthy fuel and payload flexibility, impressive operational range and a multi-mission capability.

Key suppliers to the Rotron rotary engine include:
Acorn
Eriks
Freshlook
Invertacast
K+N
Motoelectrical.com
Motorparts
Pagent+Golver
Portland Engineering
Sparkplugs.co.uk
Webcon

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September 2015 Issue 04 | **Focus**

Autopilots/Flight Controllers

The **Unmanned Systems Technology** 'focus' examines all elements that are critical to the success of the unmanned vehicle. Encompassing everything from engines to aerodynamics, chassis structure to electronics, GPS to camera and imaging systems – every component, the materials it's made of, the coatings and surface treatment applied to it, and how to improve on it will be studied in great detail.

In our Autumn/Fall 2015 issue, we turn our attention to the crucially important field of AUTOPILOTS/FLIGHT CONTROLLERS.

The autopilot/flight controller is at the heart of a UAV design, but there is a wide range of different approaches to its implementation. From GPS waypoints, geofencing and camera control to automated take-off and landing, this focus article will look at the different software design approaches from centralised to distributed control and the hardware required for effective operation, trading off power and weight. Testing autopilots with hardware and software-in-the-loop (HIL/SIL) is also becoming a more important factor in demonstrating reliability. As the market matures, open source and standardisation for both fixed-wing and

rotary craft become more critical factors driving developments that will dominate the industry for the next five years.

If you are a manufacturer of autopilots/flight controllers, and working with unmanned vehicles, our editors would be pleased to talk to you. Don't miss this opportunity to be involved in an in-depth insight which will be used as a reference by engineers worldwide for many years to come.

SEPTEMBER 2015 – ISSUE 4
FOCUS: AUTOPILOTS/FLIGHT CONTROLLERS

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Motion Control Systems

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In our Autumn/Fall 2015 issue, we turn our attention to the innovative field of MOTION CONTROL SYSTEMS.

All automated, autonomous and remotely operated vehicles rely heavily on precise, accurate control of linear and rotary motion for propulsion and manoeuvring, pointing and focusing of sensors, management of weapons, manipulators and other tools.

Control systems must variously be able to start and stop movement, and adjust speed and torque, with precise timing and provide position feedback reliably in the harshest of operating conditions, a requirement that makes great demands on electrical, mechanical and electronic engineering and close integration with software-driven digital control systems. It is a considerable challenge!

If you are a manufacturer of motion control systems, and working with unmanned vehicles, then our editors would be pleased to talk to you. Don't miss this opportunity to be involved in an in-depth insight which will be used as a reference by engineers worldwide for many years to come.

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September 2015 Issue 04 | **Insight**

Battery Technology

Issue 4 of **Unmanned Systems Technology** will be published in Autumn/Fall 2015 and we'll be focusing specifically on the latest developments in BATTERY TECHNOLOGY

Battery technology is a critical element in many unmanned system designs. This article will look at the current state of the art, such as the capacities available from current lithium polymer cells to lithium sulphide, sodium-ion and a wide variety of fuel cells, with the associated system requirements. It will also look at the charging and monitoring architectures that are needed to keep the cells operating safely but which are very much dependent on cell chemistry.

If you are a manufacturer of batteries, charging devices or associated technology that's helping to drive this fascinating and crucial element of the unmanned system forward then our editors would be pleased to talk to you.

Don't miss this opportunity to be involved in an in-depth insight which will be used as a reference by engineers worldwide for many years to come.

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INSIGHT: BATTERY TECHNOLOGY

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September 2015 Issue 04 | **Insight**

Unmanned Surface Vehicles (USVs)

Issue 4 of **Unmanned Systems Technology** will be published in Autumn/Fall 2015 and we'll be focusing specifically on the latest developments in UNMANNED SURFACE VEHICLES (USVs).

USVs come in all shapes and sizes – from small research craft to giant container ships – and there is a wide variety of propulsion and control systems in use. Battery-based systems, diesel power and even sail are all factors to take into account for the control systems of USVs, with both proprietary and open architecture implementations. Our UST-4 insight article will look at the latest developments and plans for autonomous and unmanned craft on the world's seas and oceans.

If you are a manufacturer of an innovative USV, or key components helping drive the technology forward, our editors would be pleased to hear from you.

Don't miss this opportunity to be involved in an in-depth insight which will be used as a reference by engineers worldwide for many years to come.

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INSIGHT: UNMANNED SURFACE VEHICLES

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