



# Nanosatellites heading for space

Clyde Space, a Scottish company, researches new application options for nanosatellites. To this end, it counts on brushless DC motors by maxon motor.

UKube-1 is the first British CubeSat mission – and the first Scottish satellite ever. His trip in the space took place with a Russian Sojus 2 rocket in July, 2014. On board the UKube-1 satellite, there is a GPS device for measuring the weather in the plasmasphere, as well as a camera that will make images of Earth. The aim is to record the effects of radiation on technical devices by means of an innovative new image sensor and to find out whether the reliability of communication satellites can be improved by using cosmic radiation. Furthermore UKube-1 contains various instruments that enable British students to interact with the space vehicle.

Nanosatellites or CubeSats are miniaturized satellites used in space research. They are only 10 x 10 x 10 cm big and weigh less than 1 kg. The cost-effective and practical satellites were developed for research purposes. To improve the inclination control for the small CubeSats, Clyde Space cooperate with maxon motor. This opens up new areas of application for nanosatellites, for example observing the Earth with high-resolution cameras, transmitting data with high bandwidth, applications in the fields of space science and astronomy, or precision inspection of new technology in orbit.

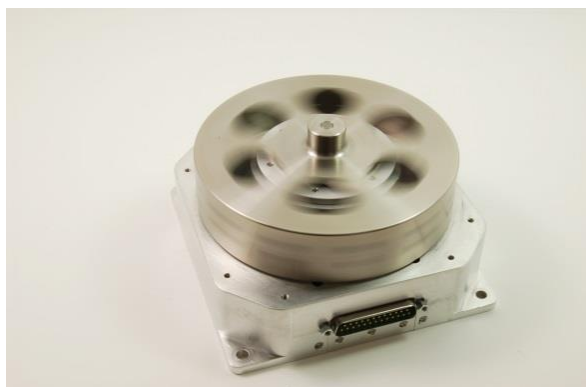
## Innovative inclination control developed

Clyde Space and maxon motor have jointly developed a tri-axial inclination control system. It is based on torque positioning by means of a reaction wheel. The wheel is driven by a brushless DC motor of maxon. When the speed of the reaction wheel changes, a reaction

moment is generated; as a result, the CubeSat is rotated. The satellite is stabilized by means of rotation at constant speed. To achieve complete inclination control on all three axes, several reaction wheels are used. Clyde Space was looking for a cost-effective solution and decided on a brushless standard maxon motor with a diameter of 20 mm. maxon motor modified this product to suit the application environment, delivered and installed the reaction wheel and ensured proper dynamic calibration of the entire subassembly.

“maxon’s participation in the project was decisive for the development of the reaction wheel. We are now able to provide our customers with complete tri-axial inclination control based on series-produced components,” explains Craig Clark, CEO of Clyde Space. When he chose the components, high resilience was important: “We specifically chose maxon motor to ensure that the brushless DC motors can handle the strong vibrations and impacts during the rocket start and the high cyclical thermal load and radiation in orbit.”

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maxon motors drive the reaction wheels that control the inclination of the satellite. © Clyde Space

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See more about UKube-1:  
<https://www.youtube.com/watch?v=NVomGcWN34s>



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