

AI-Driven Overhead Line Inspection Uses CAMCOPTER UAV

Siemens has announced that it has launched a new service approach for overhead line inspection called “SIEAERO”, using artificial intelligence and a long-range unmanned aerial vehicle (UAV). The flights are performed with Schiebel Group’s CAMCOPTER S-100, a high-performance long-range UAV for beyond visual line-of-sight operation with a high payload capacity.

SIEAERO smart analytics software utilizes AI and machine learning to store, manage and analyze all data in one integrated software system. To reduce the needed amount of flights and inspection efforts drastically, SIEAERO is using a unique high-resolution multi-sensor-system that can record all needed data in one go. Compared to conventional overhead line inspection, SIEAERO service is fully automated, faster and more precise. Siemens has been working closely with German and Austrian transmission system operators (TSO) TenneT and APG on the development of the SIEAERO overhead line inspection service since 2016. With both TSOs, Siemens has worked on test cases and the validation of a comprehensive inspection approach.

“SIEAERO is a gamechanger in overhead line inspection because we are using digitalization to bring services for our customers to the next level,” says Mirko Düsel, CEO Transmission Solutions at Siemens’ Energy Management Division. “Everything, from planning and performing inspection flights, managing and analyzing the gathered data to report generation and long-term data archiving, is more cost-efficient with SIEAERO – and it provides better and faster results on top.”

In North America and Europe alone there are more than 200,000 kilometers of overhead lines transmitting power to households and industries. All of them are critical infrastructure that need regular inspection to avoid failures. Today, TSOs inspect their power lines with helicopters at least once a year. Siemens has developed the SIEAERO service concept cooperating closely with customers and introduced a series of innovations to improve transmission line inspection.

The S-100 UAV carries the SIEAERO high-end multi-sensor system, which was specifically developed to meet the complex requirements of overhead line inspections. Since all necessary sensors and cameras are combined in one multi-sensor system, all relevant inspection data are recorded in one go, making it faster and more cost-efficient compared to conventional services.

The extensive amount of multi-sensor data generated during the flights is handled by the SIEAERO smart data analytics software. The software was also developed by Siemens and is based on AI and deep learning for automated detection and assessment of faults and issues along the overhead lines. The documentation of the complete lines as well as the relevant findings and results can be directly integrated into the customers’ existing asset management systems. These are relevant for trend monitoring and preventive maintenance.

SIEAERO not only reduces the time for flight execution and data analysis from weeks or even months to a few days, but also delivers more precise results while using sensors above industry standard. For example, the 3D LIDAR Sensors used in SIEAERO have 120 dots per m², while industry standard is about 30 dots per m². More sensor data results in more precise analytics and results. Moreover, SIEAERO uses five cameras with 100 megapixels each, and the multi-sensor system also includes infrared and corona sensors.

Schiebel Group is also involved in R&D activities to ensure that specific requirements are met. SIEAERO is utilizing the S-100 with a flight distance up to 200km and a sensor load capacity of 50 kg. Siemens has partnered with Lufthansa Aerial Services for the operation of UAVs. Lufthansa will perform the SIEAERO inspection flights globally. Currently most countries do not allow the operation of UAVs beyond visual line of sight. Once national regulations change, SIEAERO will utilize the CAMCOPTER S-100.