Non-contact device and method suitable for corrosion level measurement of overhead structures

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Abstract Corrosion is a common matter，but the corrosion of overhead structures such as transmission towers, offshore wind power, and huge storage tanks in chemical plants is not readily observable. For the corrosion of these overhead structures, the traditional manual climbing observation is dangerous, and there is no indicator to determine the level of corrosion is very dependent on the experience of workers. Herein, we present a non-contact device and method suitable for corrosion level measurement of overhead structures. The non-contact device includes, among other parts, a drone, a non-contact photo-thermal sensor and a ground station. The non-contact device is carried by a drone to the vicinity of overhead structures, and the operator controls the ground station to obtain the thickness of the corrosion and rust layer in real time at the measured area from a distance. The thickness data of the corroded rust layer is measured by a non-contact photothermal sensor and returned to the operator as a numerical value. Field test flight results show that the device's maximum flight altitude of 50m, endurance time of 30 minutes, the farthest distance between the optical and thermal probe is 2m from the part being tested, without affecting the detection accuracy of the premise of the detection of the state of the maximum wind level 4, corrosion detection accuracy can be accurate to two decimal places. The device and method can solve the problem that the corrosion level of high-altitude structures is not easy to observe and can provide a basis for judging their corrosion level.

Keywords non-contact; overhead structures; corrosion