In China, infrared thermal imaging technology has been effectively applied in the hydropower sector for various purposes, including equipment monitoring, leak detection, and maintenance optimization. Here are some notable case studies:

1. Levee Leakage Detection in Hunan Province

A recent study conducted in Xiangyin County, Hunan Province, demonstrated the effectiveness of infrared thermal imaging technology for detecting seepage in levees. The research utilized a DJI M300RTK UAV equipped with a Zenith H20T gimbal to collect both visible and infrared images of a potential leakage point. The results indicated that infrared thermal imaging could accurately identify leakage hazards, particularly at night when it outperformed visible light methods. This application highlights the technology's potential for enhancing flood safety by enabling timely interventions

2. Monitoring of Hydropower Equipment

In several hydropower stations across China, infrared thermal imaging has been implemented to monitor critical equipment such as generators and transformers. For instance, a specific hydropower facility employed thermal cameras to detect overheating components, which could indicate electrical faults or mechanical failures. By regularly monitoring temperature variations, maintenance teams can proactively address issues before they lead to equipment failures or outages.

3. SF6 Gas Leak Detection

Infrared thermal imaging is also utilized for monitoring SF6 gas leaks in high-voltage equipment within hydropower plants. The technology allows for quick and non-invasive detection of gas leaks that could pose environmental hazards and safety risks. By employing optical gas imaging cameras, operators can identify leak points without interrupting power generation, ensuring compliance with environmental regulations while maintaining operational efficiency.

4. Preventive Maintenance Programs

Many hydropower facilities have integrated infrared thermal imaging into their

preventive maintenance programs. For example, routine inspections using thermal cameras have become standard practice to assess the condition of electrical connections and mechanical components. This proactive approach helps in identifying potential problems early, thereby reducing downtime and maintenance costs.