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| ⊙ Visibility | public |
| ≡ Title | Wind Turbine Blade Internal Inspection Robot |
| ≡ Description | For modern wind farms, the robot delivers rapid deployment, autonomous movement, and AI-enhanced defect identification |

# 🌐 Wind Turbine Blade Internal Inspection Robot — One-Pager (English Version)

*High-Precision · Internal Blade Health Assessment · Autonomous Operation*

## Wind Turbine Blade Internal Inspection Robot

**Internal Defect Detection · Non-Destructive Testing · Faster & Safer Blade Inspection**

This robotic system is engineered for the **internal structure inspection of wind turbine blades**, providing high-precision imaging and defect analysis without requiring technicians to enter confined spaces.

Designed for modern wind farms, the robot delivers **rapid deployment, autonomous movement, and AI-enhanced defect identification**, solving the industry's most challenging O&M problem: **internal blade damage detection**.

## CORE HIGHLIGHTS

- **Enters blade interior for full-length inspection**

- **High-definition optical imaging** for cracks, delamination, moisture

- **Infrared thermal sensing** for early-stage structural anomalies

- **360° environmental perception inside blade cavity**

- **Lightweight, compact, and foldable** for easy transport and insertion

- **Real-time wireless data transmission**

- **AI-assisted defect recognition** (integrates with Inspur Cloud models)

- **Supports all major turbine brands** (GE, Siemens Gamesa, Vestas, Goldwind)

# APPLICATION SCENARIOS

## 1. Blade Internal Structural Integrity Inspection

Detects:

- Internal cracks

- Bonding defects

- Resin voids

- Delamination

- Moisture and water ingress

**Value:** Replaces dangerous confined-space manual entry; improves inspection accuracy.

## 2. Damage Assessment After Extreme Weather

- Sandstorm erosion

- Lightning strike assessment

- Typhoon impact checks

**Value:** Enables rapid inspection and downtime reduction.

## 3. Long-Term Health Monitoring for Aging Blades

- Prevents catastrophic blade failure

- Enables condition-based maintenance

- Supports turbine lifetime extension

**Value:** Lower O&M cost and fewer unexpected outages.

## TECHNICAL SPECIFICATIONS

| Item | Specification |
|---|---|
| **Mobility** | Crawler / wheeled movement inside blade cavity |
| **Imaging** | 4K optical camera + optional thermal camera |
| **Illumination** | High-intensity LED for dark interiors |
| **Sensors** | Temp, humidity, structural vibration |
| **Communication** | Wireless / cable-based real-time feed |
| **Power** | Long-life battery |
| **Dimensions** | Compact form factor for narrow blade entry |
| **Control** | Remote operation + automatic inspection mode |

## VALUE TO WIND FARM OPERATORS

- Eliminates need for technicians to enter confined blade space

- Inspects full blade length in **minutes**, not hours

- Enhances defect detection accuracy through **multi-modal sensing**

- Integration with **Inspur AI analytics** for automatic report generation

- Reduces O&M manpower cost and enhances turbine availability

# 风机叶片内部检测机器人 — 一页纸（中文正式版）

# 风机叶片内部检测机器人

**内部结构检测 · 无损检测（NDT）· 快速、安全、高精度巡检**

本机器人专为 **风电叶片内部结构巡检**开发，替代传统人工进入狭窄叶片腔体的高危险作业，实现内部缺陷的高清成像与智能识别。

设备具备 **自动前进、实时图像采集、多传感融合与AI缺陷识别**等能力，是风电运维的关键智能化装备之一。

## 核心亮点

- **可进入叶片内部进行全长巡检**

- **高清摄像头**识别裂纹、脱胶、空洞、层间分离

- **热成像检测早期结构异常**

- **内部 360° 感知系统**提升检测精度

- **机体轻巧、可折叠**，便于携带及叶片入口插入

- **图像与数据实时回传**

- 可与 **浪潮 AI 平台**联动进行自动缺陷识别

- 支持**各主流风机型号**：GE、维斯塔斯、西门子歌美飒、金风等

## 典型应用场景

### 1. 风机叶片内部结构完整性检测

检测内容包括：

- 内部裂纹

- 胶合层脱粘

- 树脂空洞

- 层间分离

- 水汽侵入

- *价值：**无需人工进入狭窄空间，检测更精确更安全。

## 2. 极端天气后的损伤评估

- 沙尘腐蚀

- 雷击损伤检查

- 强风冲击后的结构检测

- *价值：**快速恢复风机状态评估，减少停机损失。

## 3. 老旧风机长期健康监测

- 防止叶片断裂事故

- 支持按需维护（CBM）

- 延长叶片及风机寿命

- *价值：**降低O&M成本，提升风电场可用率。

# 技术参数

| 项目 | 参数 |
| --- | --- |
| 移动方式 | 内腔履带 / 轮式运动机构 |
| 成像系统 | 4K 可见光 + 选配热成像 |
| 照明系统 | 高亮度LED补光 |
| 检测传感器 | 温湿度、振动、结构异常采集 |
| 通信方式 | 无线 / 有线实时图传 |
| 电源 | 长续航电池 |
| 尺寸 | 小型化、便于进入叶片入口 |
| 控制方式 | 远程操控 + 自动巡检 |

# 为风电场带来的价值

- 避免人工进入叶片内部的高风险作业

- 几分钟完成整支叶片内部巡检

- 多传感器融合提升缺陷识别准确率

- 可与浪潮 AI 系统自动生成巡检报告
- 降低长期运维成本，提高风机发电可用率