



Suspendem

***A LEADER IN UP-TOWER
MAINTENANCE SOLUTIONS***

www.suspendem.com

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SUSPENDEM INTERNATIONAL

Professionalism-Safety-Quality-Innovation



SUSPENDEM VALUE PROPOSITION

Suspendem helps wind farm owners, service providers and OEM's maintain & increase asset integrity and performance through quality maintenance, inspection and repair services.



SUSPENDEM VALUES

*Professionalism-Safety-Quality-
Innovation*

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SOLUTIONS FOR ANY PROJECT



SUSPENDEM CORE SERVICES

- BLADE MAINTENANCE:
INSPECTION & REPAIR
- RETROFITS
- TURBINE MAINTENANCE
- ACCESS SOLUTIONS



BLADE MAINTENANCE PROGRAM (BMP)

WHY?

- Increase AEP
- Maximize warranty
- Predict & plan maintenance
- Extend asset life



HOW?

Baseline blade inspections



Regular blade inspections



Maintenance predictions



Priority interventions



Predicted maintenance



Quality control

BMP: INSPECTIONS

VISUAL INSPECTION
(scope, camera, drone, RA)



**EXTERIOR EXPLORATORY
INSPECTION**



**LIGHTNING PROTECTION
SYSTEM**



INTERIOR INSPECTION



BMP: LEP Maintenance

BEFORE



AFTER



1	2	3	4	5	6	7	8	9	10		
2	Date:	27-08-2016	Suspendem								
3	Inspector:	T.V. W.S.	Kruiger								
4	Wind Farm:	KEPA	Kruiger								
5	Location:		EXTERIOR INSPECTION								
6	Description of Damage:	Damage Leadinge									
7	Distance From Root(m):	~38M	Length (cm):								
8	<input checked="" type="checkbox"/> Leading Edge		<input type="checkbox"/> Pressure Side								
9	<input type="checkbox"/> Trailing Edge		<input type="checkbox"/> Suction Side								
14	13	12	11	10	9	8	7	6			

BMP: REPAIR & RETROFITS

BLADE REPAIR



VORTEX GENERATOR INSTALLATION



BLADE REPAIR

(Before / After)



BMP: QUALITY CONTROL

INDEPENDENT QUALITY CONTROL INSPECTORS

- Ensure contractors, OEM's and ISP's are fulfilling obligations
- Save \$\$ and time on warranty negotiations
- Quality, timely reporting
- Blade services, HSE, other


Suspendem



RAPID REPORTING SYSTEM

PROFESSIONAL REPORTING

- Proprietary application which standardizes inspection, repair & reporting processes
- Professional inspection reports in 48 hours or less
- Aggregate data in excel file for future planning
- All photos available to customer

Suspendem
TRAVERS SUR CORDES
ROPE ACCESS INCORPORATED

Suspendem
380 Wellington St., Tower B, 6th floor,
London, ON, N6A5B5
www.suspendem.com
www.facebook.com/suspendem
info@suspendem.com

**END OF WARRANTY INSPECTION:
ROTOR BLADES AND LIGHTNING SYSTEM**

FOR: XXXXXX
WIND PARK: XXXXXX
REPORT #: XXXXXX
WEC #: XXXXXX
INSPECTION DATE: 2015-03-17

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Suspendem Rope Access Inc.
C.P. 6392, Gaspe QC, CAN, G4X2R8
www.suspendem.com
www.facebook.com/suspendem
info@suspendem.com

EXTERIOR ROTOR BLADE INSPECTION RESULTS
Exterior Summary Rotor Blade No. :

Defect No.	Radius	Side	Size	Flaws	Description of Defects
1	8m	Pressure Side	0,8cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Impact point
2	9m	Suction side	0,5cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Missing Sikaflex at screw hole
3	12m	Trailing edge	4cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Transversal crack in TE Gelcoat
4	12,5m	Trailing edge	4cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Transversal crack in TE Gelcoat x3
5	14,5m	Trailing edge	2,5cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Transversal crack in TE Gelcoat
6	16m	Trailing edge	2,5cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Transversal crack in TE Gelcoat
7	16,5m	Pressure side	4,5cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Impact point with Exposed/Damaged Fibre
8	19,5m	Suction side	5cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Impact point with Exposed/Damaged Fibre
9	23,5m	Suction side	7cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Cracked gelcoat
10	36,5m	Pressure side	3cm	FB105780_dam09photos.jpg, FB105780_dam09photos.jpg	Sikaflex plug peeling
11	37m	Pressure side	2cm	D4868871_dam09photos.jpg, D4868871_dam09photos.jpg	Missing Sikaflex on lightning receptor
12	40,5m	Trailing edge	40cm	D4868871_dam09photos.jpg, D4868871_dam09photos.jpg	Uneven TE

Comments:

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Detailed Results Rotor Blade No.:
DETAILED REPORT BY DAMAGE | BLADE NO : 2

Defect No.	Radius	Side	Size	Description
1	8m	Pressure side	0,8cm	Impact point

FB105780_dam09photo1.jpg



1 2 3 4 5 6
Date: Mar 18 2015

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Detailed Results Rotor Blade No.:
DETAILED REPORT BY DAMAGE | BLADE NO : 2

Defect No.	Radius	Web	Section	Side	Size	Description
4	12m	0	2	Pressure Side	75cm	Delamination/cracked excess resin along web foot

336046F2_dam09photo1.jpg



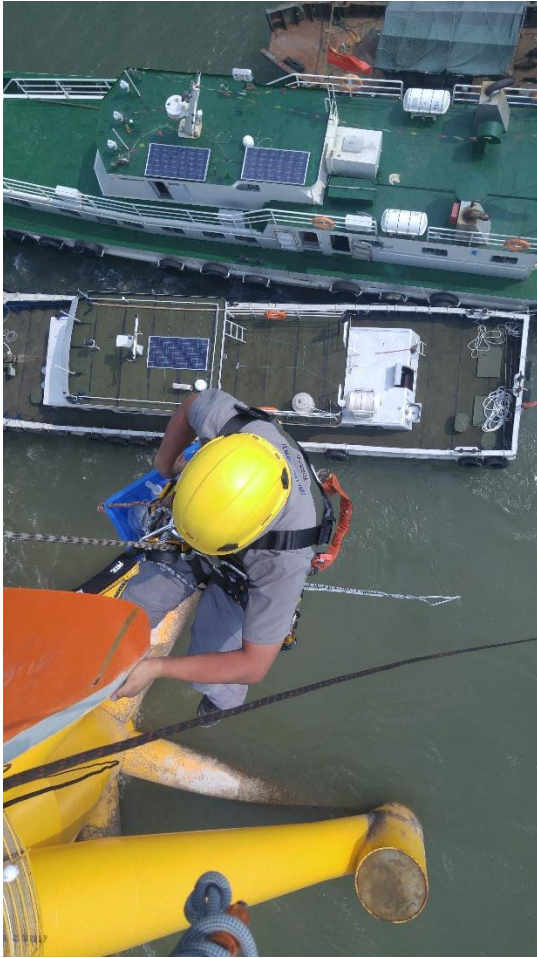
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EXPERIENCE



- Well over 1000 blade inspections – interior & exterior
- Hundreds of blade repairs annually
- LPS testing & inspections
- Well over 250 turbines cleaned & painted
- Preferred blade service provider for OEM's and owners
- Turbine experience: Siemens, Vestas, GE, Senvion, Enercon
- Blade experience: LM, TPI, Vestas, MFG, Tecsis, Siemens, Enercon

OFFSHORE WORK



360 PLATFORM WORK

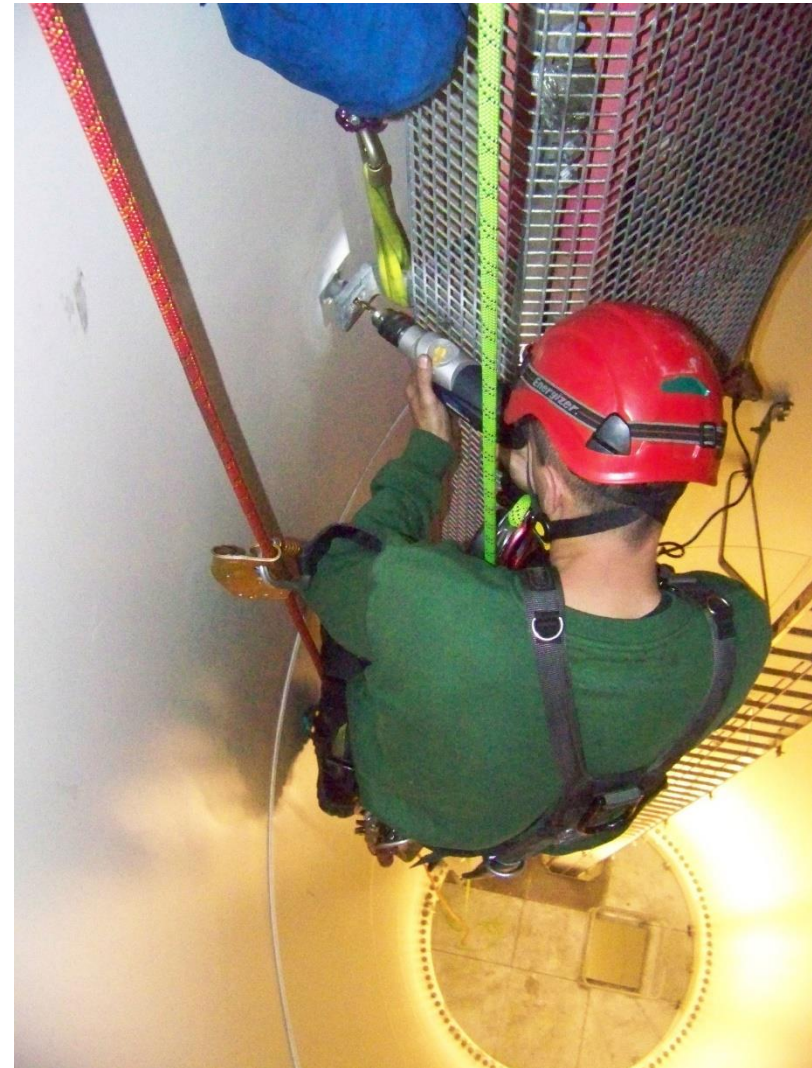




**Composite repair from 360
suspended platform**

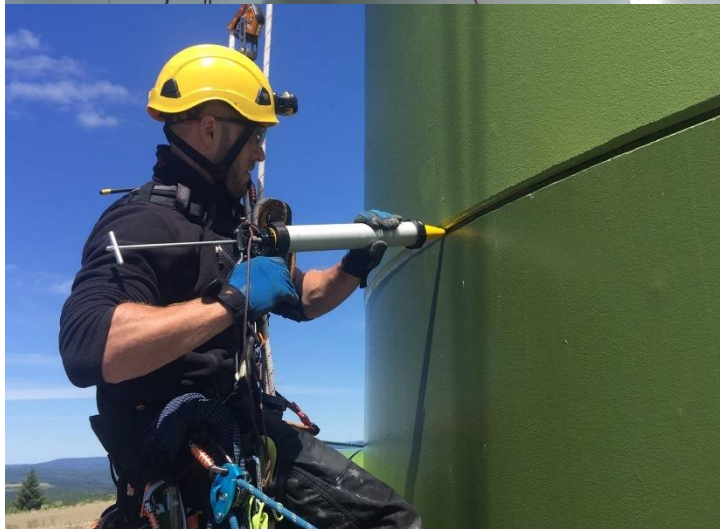
TURBINE MAINTENANCE SERVICES

- Preventive maintenance
- Torque & tension
- IBEX climb assist – certified installer
- Alignment
- Repairs & retrofits
 - Yaw puck replacement
 - Deck bolt replacement
- Oil changes and spill clean-up
- Bus-bar maintenance
- Service support technicians



TURBINE MAINTENANCE SERVICES

- Tower painting (interior & exterior)
- Rust removal
- Concrete sealing
- Grease & oil spill cleaning



HEALTH, SAFETY & ENVIRONMENT



- HSE is top priority
- Continuous training
- FTP site for customers
- State of the art equipment inspection, tracking and control system
- Sustainability commitment



Suspendem Equipment Inspection Record

Presently assigned to Keith Herron

This document shows the annual inspection results of the equipment assigned to the person listed above. The inspection(s) were carried out on the date shown in a manner that meets or exceeds the manufacturer's recommended procedures.

Type	Model Name	Serial Number	Our Tag	Inspection Date	Result
Cable grab	Vii-Go	V13-5119	150897	2016-01-28	OK
Lanyard-Tracel	CA226#RE6	139802	160787	2016-02-26	OK
C14.2					
Sling	Anneau C40 060	13268GM5087	150833	2016-02-01	OK
JAG SYSTEM	Jag System Pulley	15149QD5626	150872	2016-01-28	OK
Carabiner, AMD	AMD M34 TL	14342UG0045	150873	2016-01-28	OK
Carabiner, AMD	AMD M34 TL	14342UG0042	150874	2016-01-28	OK
Carabiner, Vulcan	Vulcan M73 TLA	15076J0715	160533	2016-09-23	OK
Carabiner, Vulcan	Vulcan M73 TLA	15076J0722	160539	2016-09-23	OK
Sling	Anneau C40 120	15139GS0873	160896	2016-03-03	OK
Rope 300'	Vector	1505122-01	151439	2016-02-01	OK

End of records for Presently assigned to Keith Herron

The information provided above is accurate as of the date of printing, 01/09/16.

Verified by: Keith Herron, Equipment and IT Manager, Suspendem,
28 Ave Saint-Patrick, Gaspe, Cc. G4X 2Y2
equipment@suspendem.com



NUMBER	TYPE	VARIANT
C14.2	Rescue	300' RA

Tag	Equipment Model	Serial
150833	Anneau C40 060	13268GM5087
150872	Jag System Pulley	15149QD5626
150873	AMD M34 TL	14342UG0045
150874	AMD M34 TL	14342UG0042
151439	Vector	1505122-01
160533	Vulcan M73 TLA	15076J0715
160539	Vulcan M73 TLA	15076J0722
160896	Anneau C40 120	15139GS0873

4 x Prusik, rope protection.
13mm wrench



C - Rescue Kit
Manufacturer: Suspendem
Model: 2 - Rescue Kit
Category: Pre-Assembled
Serial No: C14.2
Tag No: 1500

Issued To: Keith Herron

Has 8 Child Items:
Sling (150833)
JAG SYSTEM (150872)
Carabiner, AM'D (150873)
Carabiner, AM'D (150874)
Rope 600' (151439)
Carabiner, Vulcan (160533)
Carabiner, Vulcan (160539)
Sling (160896)



INTERNATIONAL PARTNERS

