



# ELLE Leading Edge Protection

## RETROFIT SOLUTION



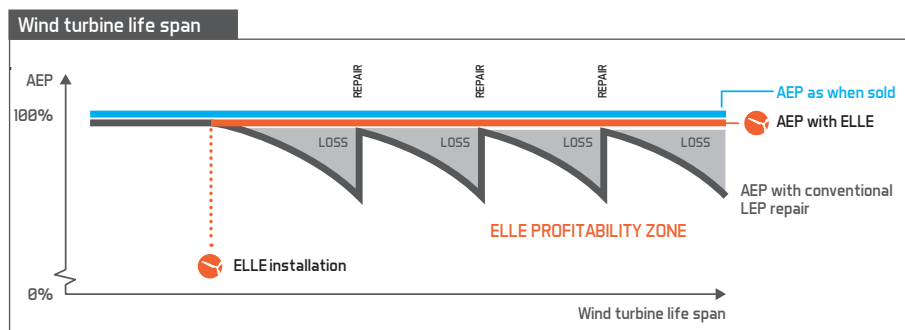
PolyTech's ELLE (Ever Lasting Leading Edge) is a market-leading design to protect blades from performance-reducing erosion caused by environmental factors like rain, hail, sun, particles, etc.

We have addressed the challenge of leading edge protection from a holistic point of view and developed a unique 360° solution - offering unmatched performance and taking into account all issues of functionality, ease of application, robustness etc.

### Breaking new ground

Conventional leading edge protection solutions have proven insufficient to prevent erosion of leading edges during a blade's life span.

Holistic development has led to a new approach to leading edge protection - a robust polyurethane softshell with unmatched capabilities.



### SUMMARY OF ELLE ADVANTAGES

- ✓ Reducing COE
- ✓ Plug & play solution with pre-cut sections and minimum use of equipment
- ✓ ELLE is designed for up-tower installation using rope or basket
- ✓ Swift application process ensures minimum downtime
- ✓ Generic or blade-specific design will fit any blade variant
- ✓ ELLE can be applied in a wide weather window. 5°C to 35°C 30-90% rH
- ✓ Insignificant modification of a blade's geometry when fitted
- ✓ Application involves no HSE hazards
- ✓ Each ELLE section is fully traceable with laser marked barcode

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## Superior performance and durability

ELLE is applied to the leading edge using sturdy, thin bonding tape and seal.

Compared to conventional tape or paint based systems, ELLE can be applied in a wide weather window, and the swift application process reduces wind turbine downtime dramatically. Application time is approx. 15 minutes/meter.

The PolyTech concept outperforms conventional leading edge protection systems significantly in terms of durability and resistance to damage in harsh weather and environmental conditions.

## Training

PolyTech offers competent training in the correct application of ELLE in dedicated in-factory facilities. Skilled technicians need training in materials and processes prior to certification for onsite installation.



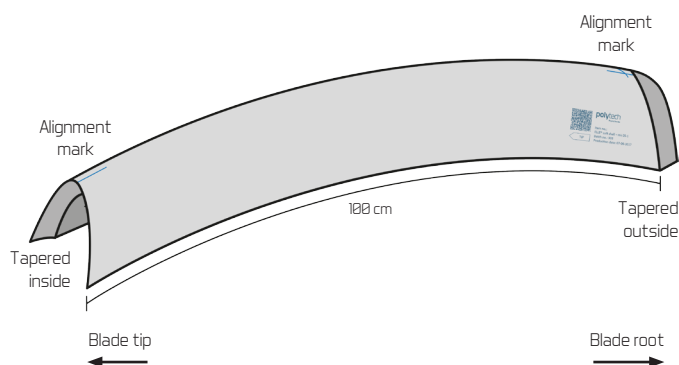
The application of ELLE involves no chemical hazards and generates no hazardous waste.

## Test results

ELLE is thoroughly lab-tested and has proven its performance in offshore installations since 2015:

- Rain erosion testing according to ASTM G73-10
  - Pristine test specimens - 100 hours without damage
  - Pre-damaged test specimens - 30 hours without additional damage
  - Aged in combination with cyclic UV/Salt spray/Low Temp. exposure according to ISO 20340 - 30 hours without damage (3 x 3 weeks cycle - test continuing)
- Tape and seal adhesion on various substrates according to ASTM 3330
  - Peel test on various substrates - Polyester/Epoxy/Filler
- Installed track record
  - Weekly deliveries of factory solution to OEM
  - Proven offshore installation since 2015 on turbines with tip speed above 95 m/s (test continuing)
  - Installation at site featuring very challenging environment
  - Proven onshore installations

## SKETCH



## Quality and traceability

ELLE is manufactured in a fully controlled production environment to ensure high, constant quality and uncomplicated, expedient application to the leading edge. PolyTech conducts continuous inhouse process testing and produces comprehensive data using SCADA.

Each ELLE section is laser marked with a QR code and a unique serial number, so that we can track every process from raw material batch to finished product.