FPL URD Commissioning Experience

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Agenda

- FPL Overview
- Background and Initial Steps
- Pilot Implementation Decisions
- What is SSUP?
- Pilot Objectives
- Testing Findings and Preventative Actions
- Final Thoughts and Recommendations

FPL is part of a larger company and consists of multiple, main divisions

Florida Power & Light – An Overview

- **Investor-owned, regulated utility under NextEra Energy umbrella**
- **Power Generation and Power Delivery divisions within FPL**
  - Power Delivery includes substation, transmission, and distribution
  - Power Generation includes nuclear, solar groups
- **Approximately 8,700 employees**
  - 34% IBEW bargaining unit

Success on starting with the technology then moving on to the dollars

Background and Initial Steps

- **Management buy-in on technology effectiveness**
  - Explanation of partial discharge technology
  - Comparison of offline PD versus DC hi-pot, VLF, tan delta, and online PD
- **Further discussions on reliability and cost**
  - Reliability: reduce future outages due to workmanship or defects
  - Cost: Reduce future O&M spend by capital spend now

FPL loves piloting new ideas to see if they will fit in with our current processes

Pilot Implementation Decisions

- How many sections is enough for statistical significance?
- What group within FPL should do the pilot?
- How many contractors should be tested?
- What does the testing process look like with the contractors?

FPL has been hardening our distribution (and transmission) grid since 2006

SSUP – Storm Secure Underground Program

- **Continuation of FPL hardening program**
  - Started with OH feeder wood to concrete pole upgrades
- **Undergrounding poor-performing laterals, mostly rear-lot**
  - Moving OH rear-of to UG front yard
  - Improved reliability and crew access
  - Vegetation O&M reduction
  - Faster storm response
  - HDD to reduce customer impact

SSUP is the division where the IMCORP pilot took place

New cable on 3 SSUP projects in PBC selected for IMCORP testing prior to energization

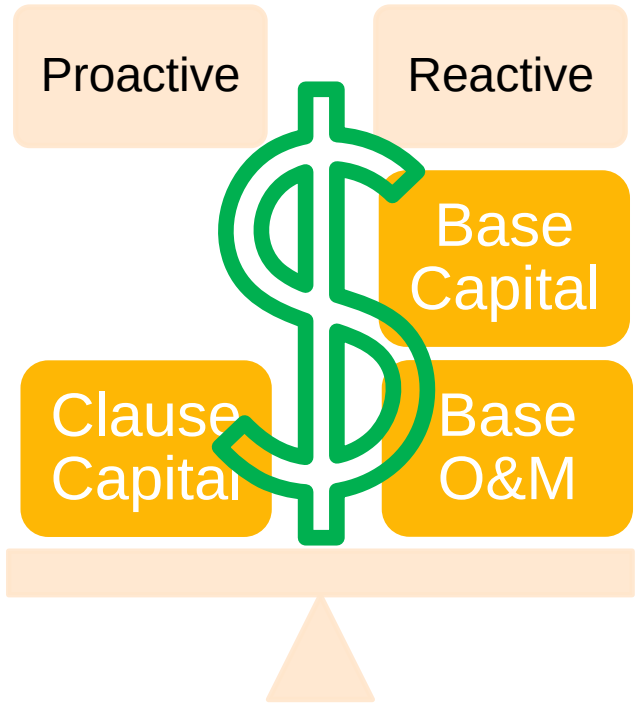
Pilot Objectives

1. **Root causes and defect rate**
2. **Proactive testing vs reactive restoration**

New cable on 3 SSUP projects in PBC selected for IMCORP testing prior to energization

Pilot Objectives

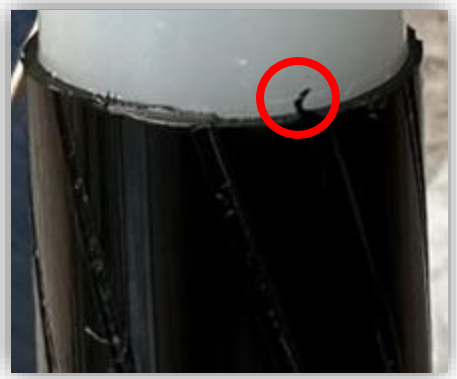
1. Defect rate and root causes
2. **Proactive testing vs reactive restoration**

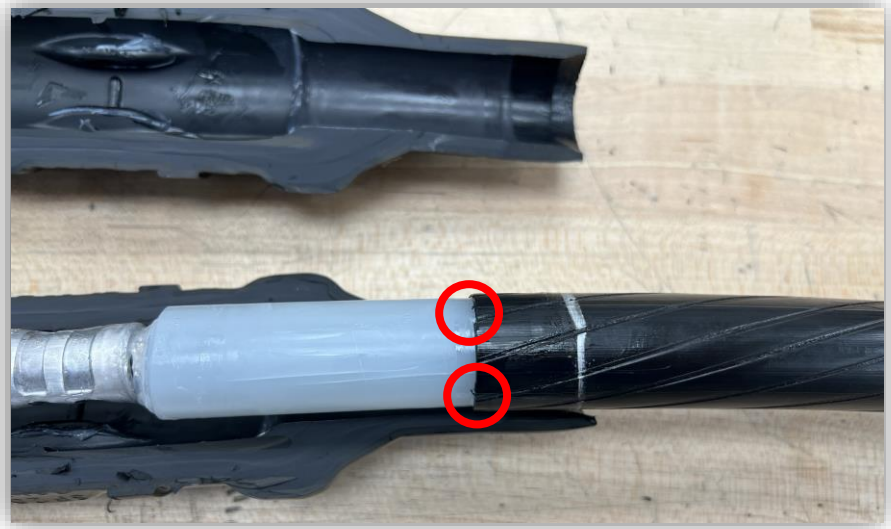


14.2% defect rate caused by workmanship failures

Testing Findings

- **119 new cable segments tested**
  - 6 segments short-term failure[1] risks → 5.0%
  - 11 segments long-term failure[2] risks → 9.2%
  - 1 outlier failure (cable cut)
- **Failure modes → 100% workmanship**
  - Non-square cuts
  - Inadequate use of void filler
- **Costs**
  - $166k total → $1,395/segment
  - 81% IMCORP daily rate, 4% IMCORP mob fee, 15% crewmen standby rate





1) Short-term failure: >5pC at or below normal operating voltage
2) Long-term failure: >5pC above normal operating voltage, assumed failure prior to 40-year life

Implementing preventative actions will reduce defect rate

New Cable Installation - Preventative Actions

- Well maintained semicon scoring tools
- Semicon layer is cut square
- Adequate use of void filler
- Contamination control on dirt roads

Dull semi-con scoring tool

Implementing preventative actions and targeted quality check testing will reduce defect rate

Thoughts and Recommendations

- **The technology works! Workmanship issues were found and mitigated**
- **Production and cost improvements on expanded program**
- **For the future: limited, annual spot testing of vendors/regions**
  - Realize base savings
  - Contractors have “skin in the game”
    - -- Implementation of monetary penalty if high defect rate
  - Limit opportunity costs
    - -- Money spent on SSUP projects versus testing
  - Training of incoming apprentices so workmanship mistakes are quickly ameliorated

QUESTIONS