

# Error-Free Splicing Machine for Underground Power Cables

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Category 3

## Project Vision

Solve the challenge of splicing  
underground medium-voltage power cables  
by **automating the full process**  
targeting **<1 hour** with **<5% failure rate**



**GOPHURRS**  
Kickoff Meeting  
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Charlotte, NC

# Fully automated MV cables splicing process



**Increase reliability** of US power grid targeting **underground cable systems**

**Improve worker safety** by removing people from the manhole during the process

Enable splicing process improvements through **Automation and AI**

Reduce **splice time to under 1 hour** and decrease **failure rate to <5%**

# Our Team

**S. Siripurapu**  
Principal Investigator  
prysmian

**V. Garcia**  
Program Manager  
prysmian

**Prysmian**  
Primary Applicant  
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**Con Edison**  
End User  
conEdison

**Exelon**  
End User  
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**PA Consulting**  
Automation Engineering  
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**ORNL**  
Testing Facility  
OAK RIDGE  
National Laboratory

**NEETRAC**  
Testing Facility  
GT | NEETRAC  
National Electric Energy Testing, Research, and Applications Center

**S. Ranganathan**  
Innovation Expert

**A. Perconti**  
Cable Engineer

**J. Lowey**  
Customer Relations

**J. Weitzel**  
MV Cable Expert

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**M. Chow**  
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**M. Meathe**  
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**A. Babu**  
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Mechanical Engineer,  
Technical Lead

**D. HasBrouck**  
Power Grid Expert

**E. Lara-Curzio**  
Director for Energy  
Transitions &  
Infrastructure Programs

**R. Duckworth**  
Sr. Engineer

**J.C. Hernandez-Mejia**  
Chief Engineer Power  
Assessment



# Key Project Milestones

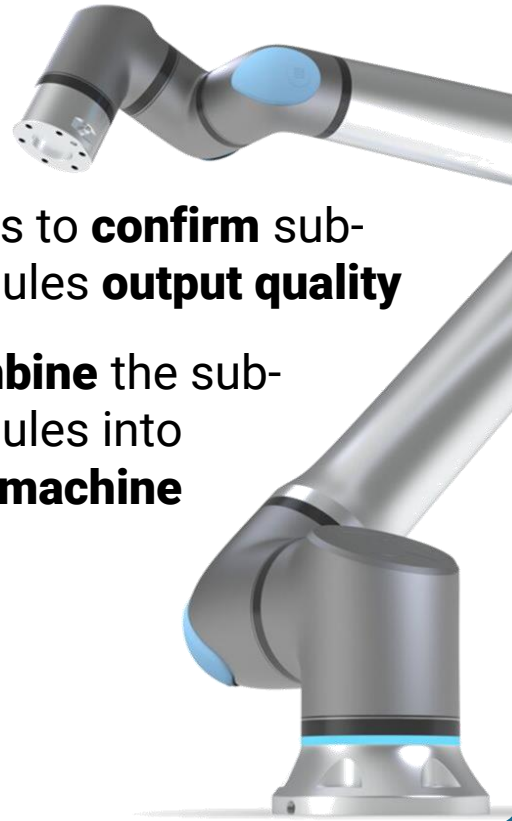
## Year 1

- Machine **design** & **technology selection**
- **Sub-modules build** for each process phase
- **De-risk** key enabling technologies



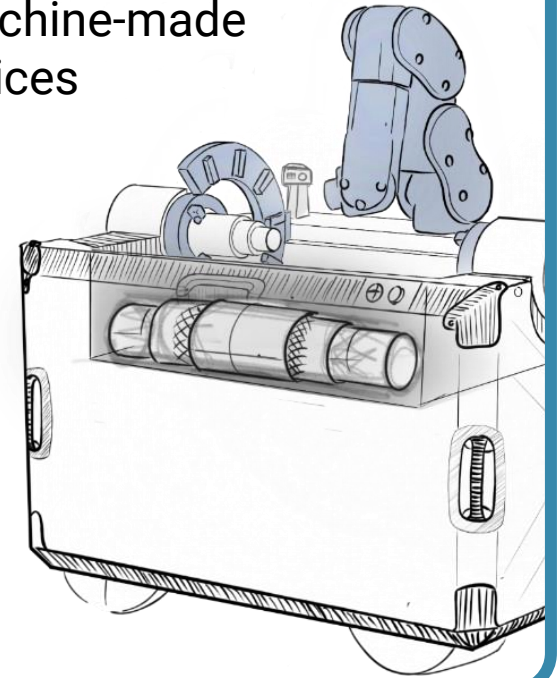
## Year 2

- Tests to **confirm** sub-modules **output quality**
- **Combine** the sub-modules into **one machine**



## Year 3

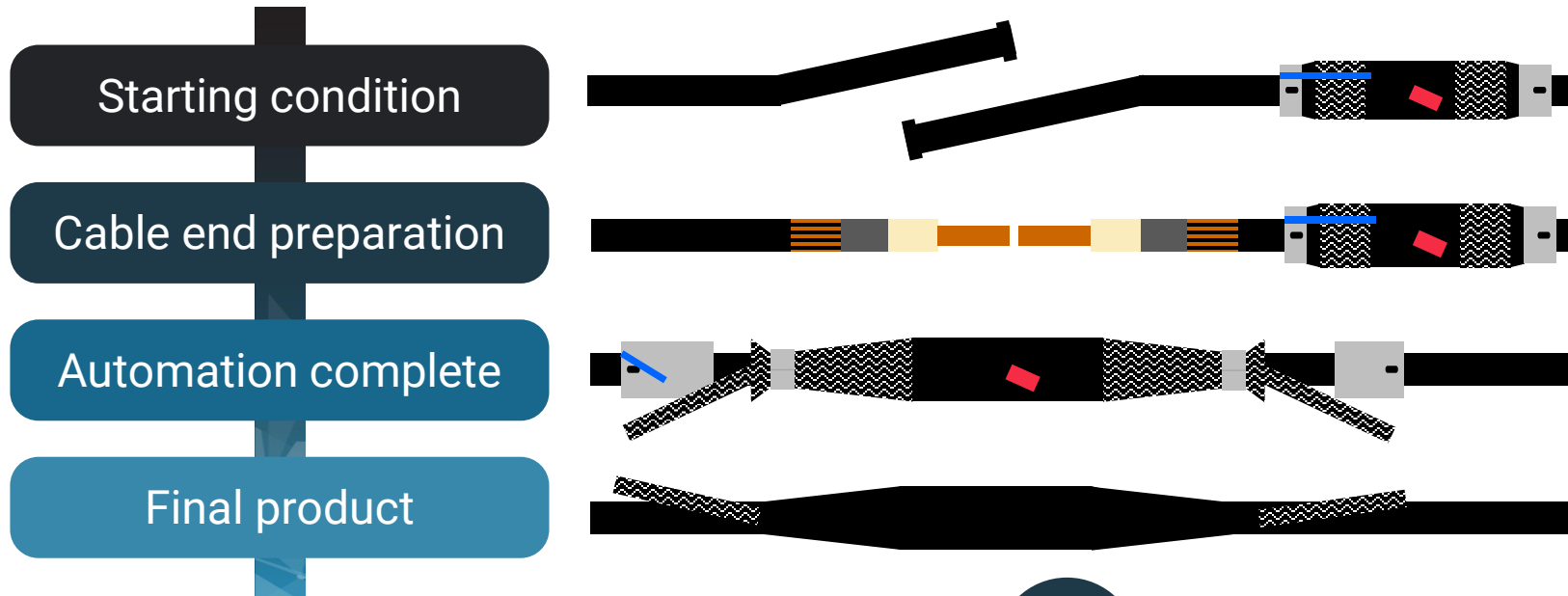
- ORNL and NEETRAC **validation testing** on machine-made splices



# Technical R&D details 1/2



Our goal is to **build an automated machine** capable of **jointing two overlapping cable ends**



## Key Novel Aspects

1. **Laser cutting** the cable polymeric layers
2. **Robotic arm** to manipulate cable layers
3. **Digital body of knowledge** of each splicing step



## Key Performance Metrics

1. **Time** to complete the splice
2. **Reliability** of the splice

# Technical R&D details 2/2



## Key Tests includes

1. **Partial Discharge** testing
2. **Mechanical performance**



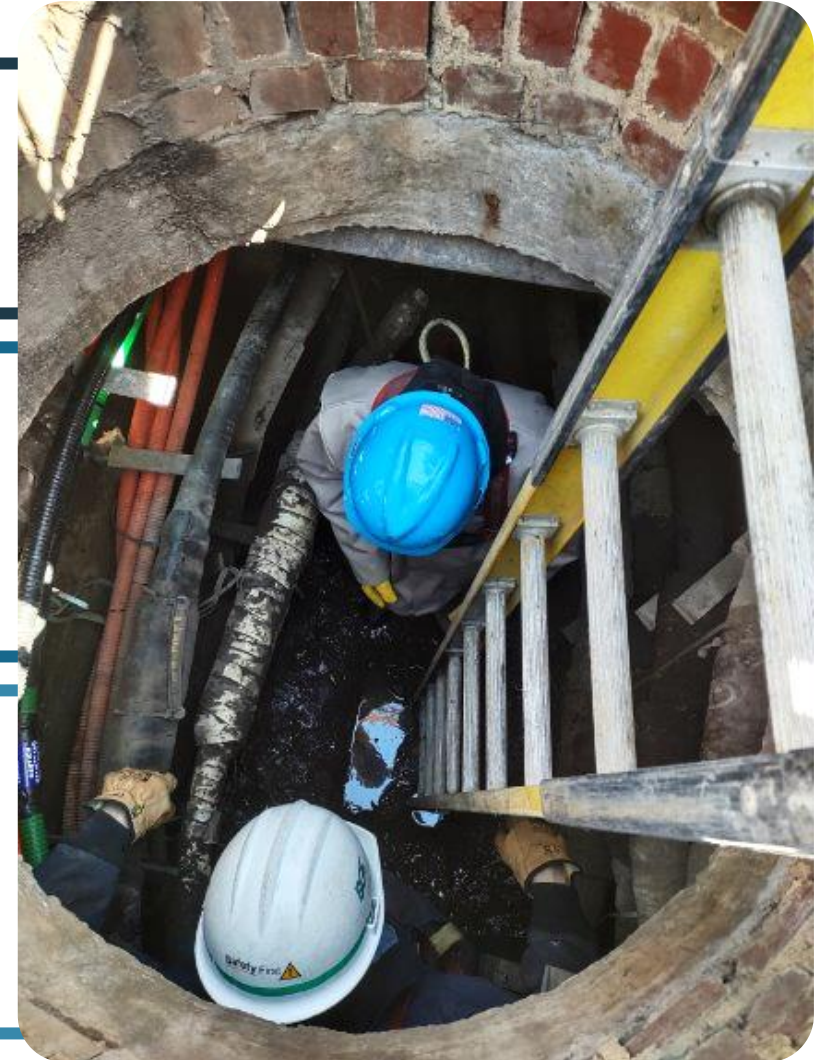
## Key Challenges and de-risk

1. **Size and weight** constraints
2. **Automating** process **steps designed for humans**
3. **Beating human** cutback **quality**



## Interesting & Exciting

1. **A machine with a laser** will perform better than a human with a knife
2. **Changing a manual splicing process** that has been the same for 100+ years



# Key Performance Metrics

today

**TIME: 4-hours** manual operation sequence

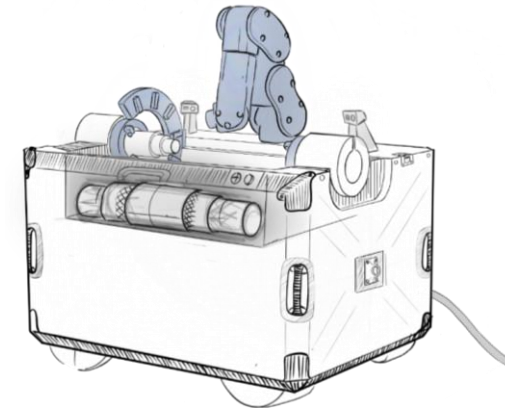


**RELIABILITY: 70%** network failures due to splice

60-80%

tomorrow



**TIME: less than 1-hour** fully automated process



**RELIABILITY: <5%** network failures due to splice

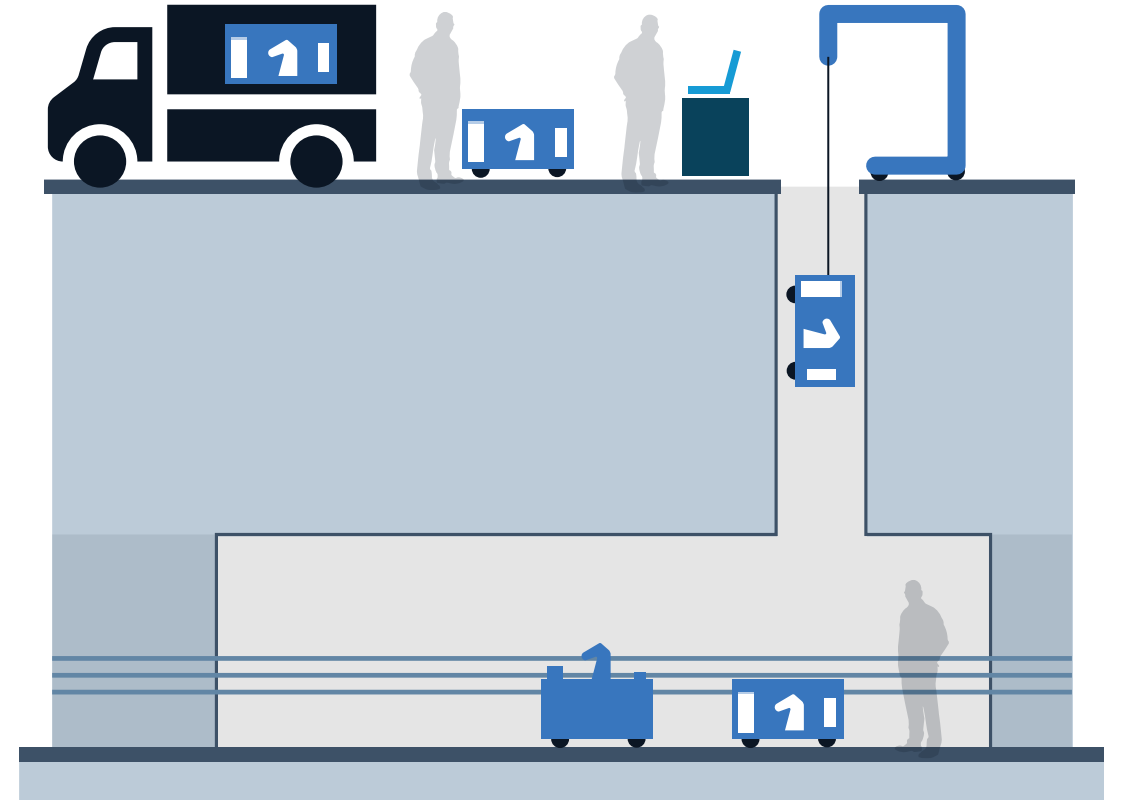
<5%

# Technology-to-Market Approach

After successful lab trials, we plan to perform extensive field validation trials with  conEdison and  exelon<sup>SM</sup>

The machine industrialization will be based on extensive field trial feedbacks

**Business model:** Prysmian Power Grids BU to commercialize and deploy the machine to utilities around the US







U.S. DEPARTMENT OF  
**ENERGY**



# Q & A



**prysmian**

*in collaboration with*



**conEdison**



**exelon**<sup>SM</sup>

*and*



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