



2026 International Conference of Doble Clients

24/7 Infrared and Visual Monitoring Systems

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Southern Company

March 29 – April 3, 2026

Boston, Massachusetts USA



Continuous IR Monitoring: Static Camera System

Roger Ely — Georgia Power Company

Static System - Initiative Goals and Driving Factors



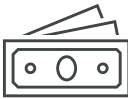
Monitoring – provide real time infrared measurements of in-service power transformers



Ease and Speed of Deployment – no outages required for installation, wireless communication with minimal additional infrastructure, consistent setup site to site

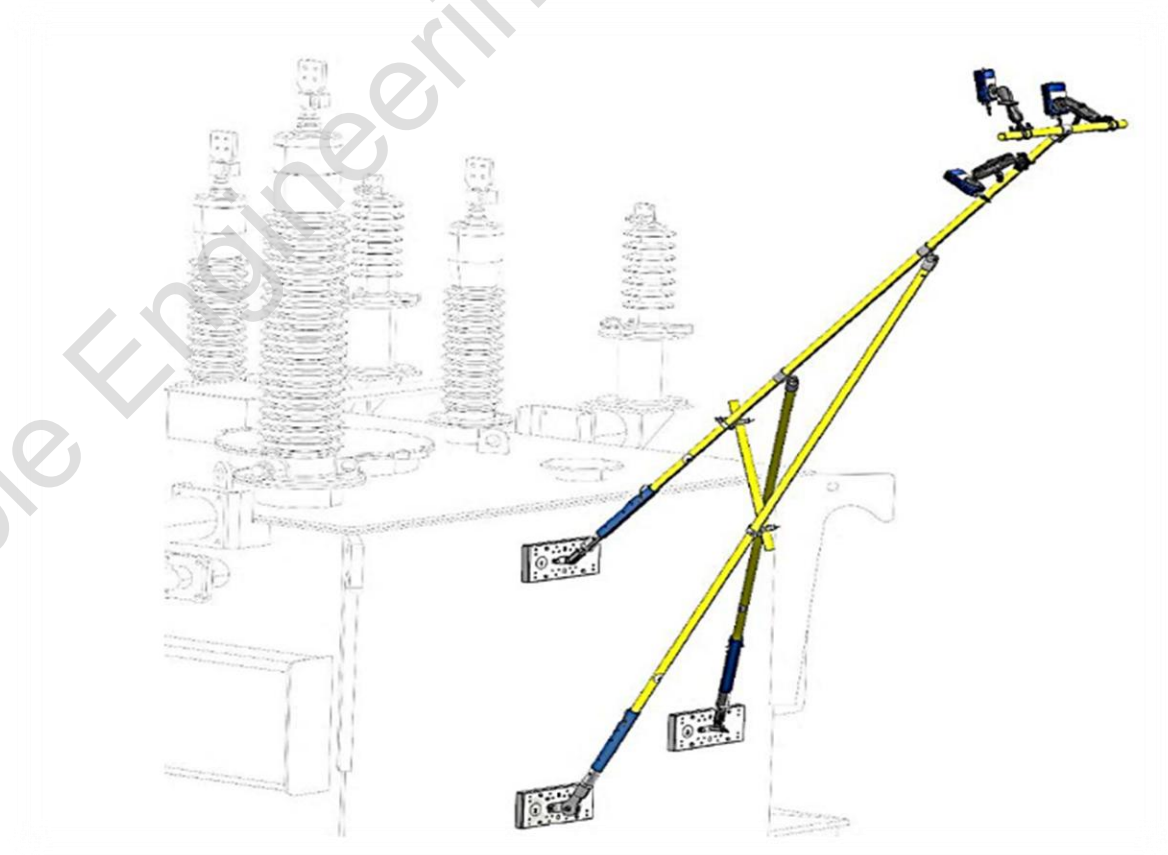


Cloud Based Accessibility – secure remote connectivity for inspection, analysis and troubleshooting

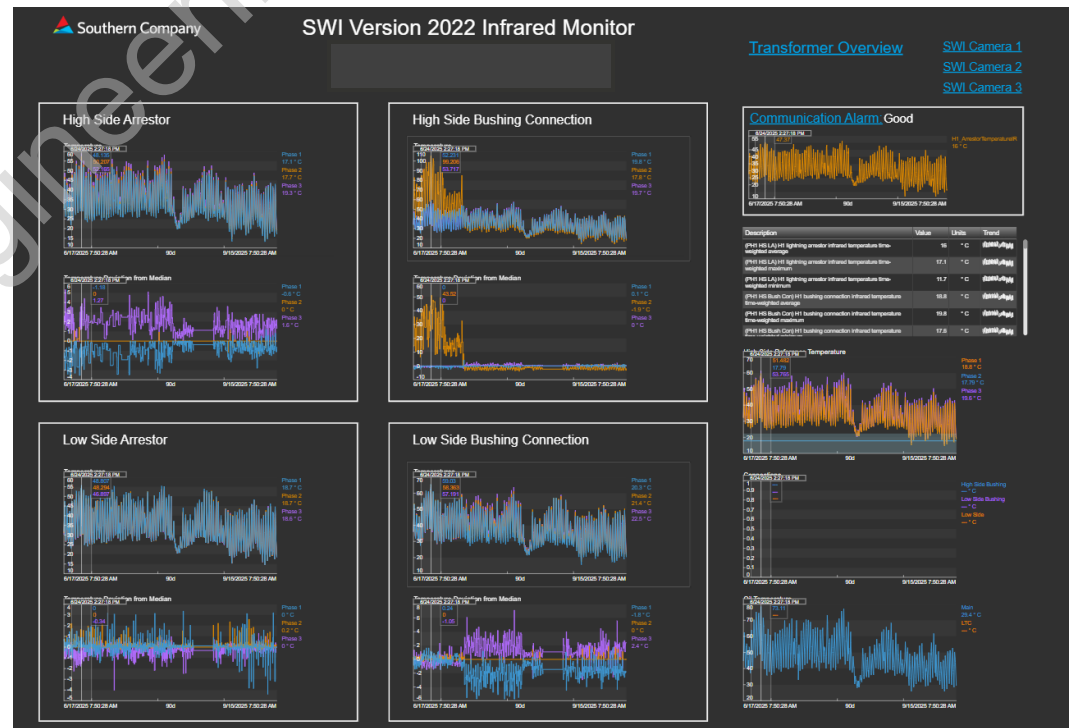


Cost effective – cost effective for large scale deployment across system with large number of assets

Static System Components - Hardware



Static System Components - Software

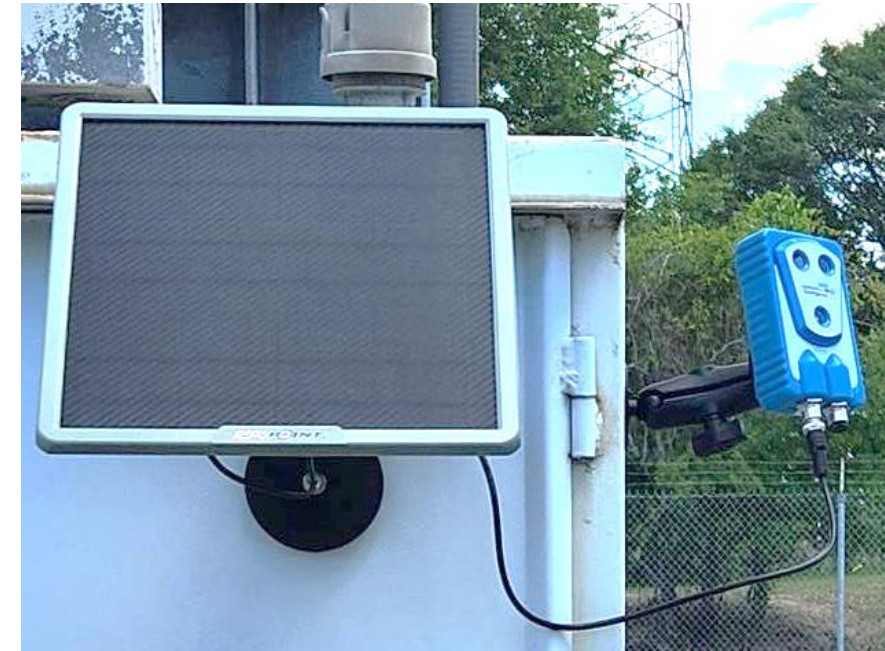


Architecture

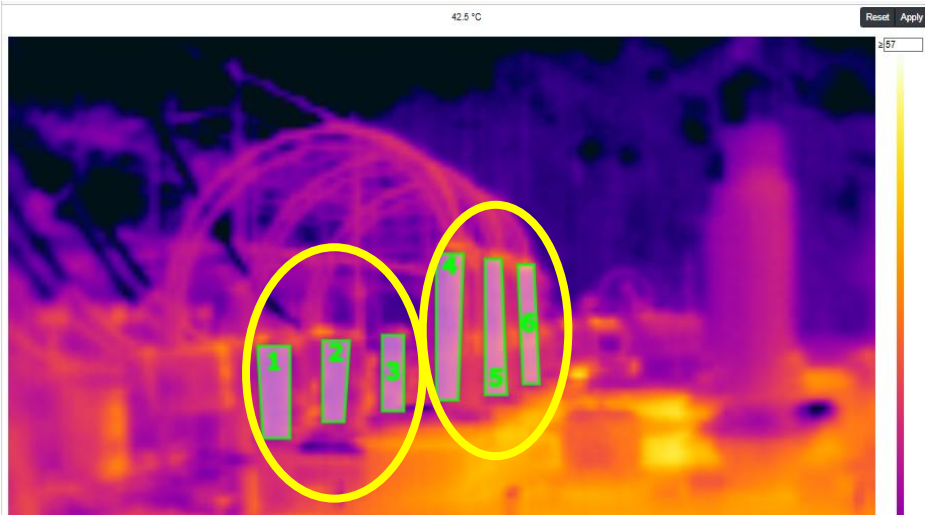


- First IR Monitoring System installed in Georgia June 2021
- Over 700 transformers monitored today

Installation Examples



Thermal and Visual Images with Polygons: Low Side Bushings and Arresters



Target Emissivity ?

0.9

Air Temperature

22

°C

Target Distance

1

m

Window Transmission

0.95

Thermal Boxes

1	Ph1 LS LA	Erase
2	Ph2 LS LA	Erase
3	Ph3 LS LA	Erase
4	Ph1 LS Bush Con	Erase
5	Ph2 LS Bush Con	Erase
6	Ph3 LS Bush Con	Erase

Thermal Settings

Reporting Rate

30m

Snapshot Settings

Default IR Palette

iron

Visual Snapshot Resolution ?

HD (1280x960)

Radiometry Parameters

Units ?

Metric

Reflected Temperature ?

22

°C

Relative Humidity

50

%

Window Temperature

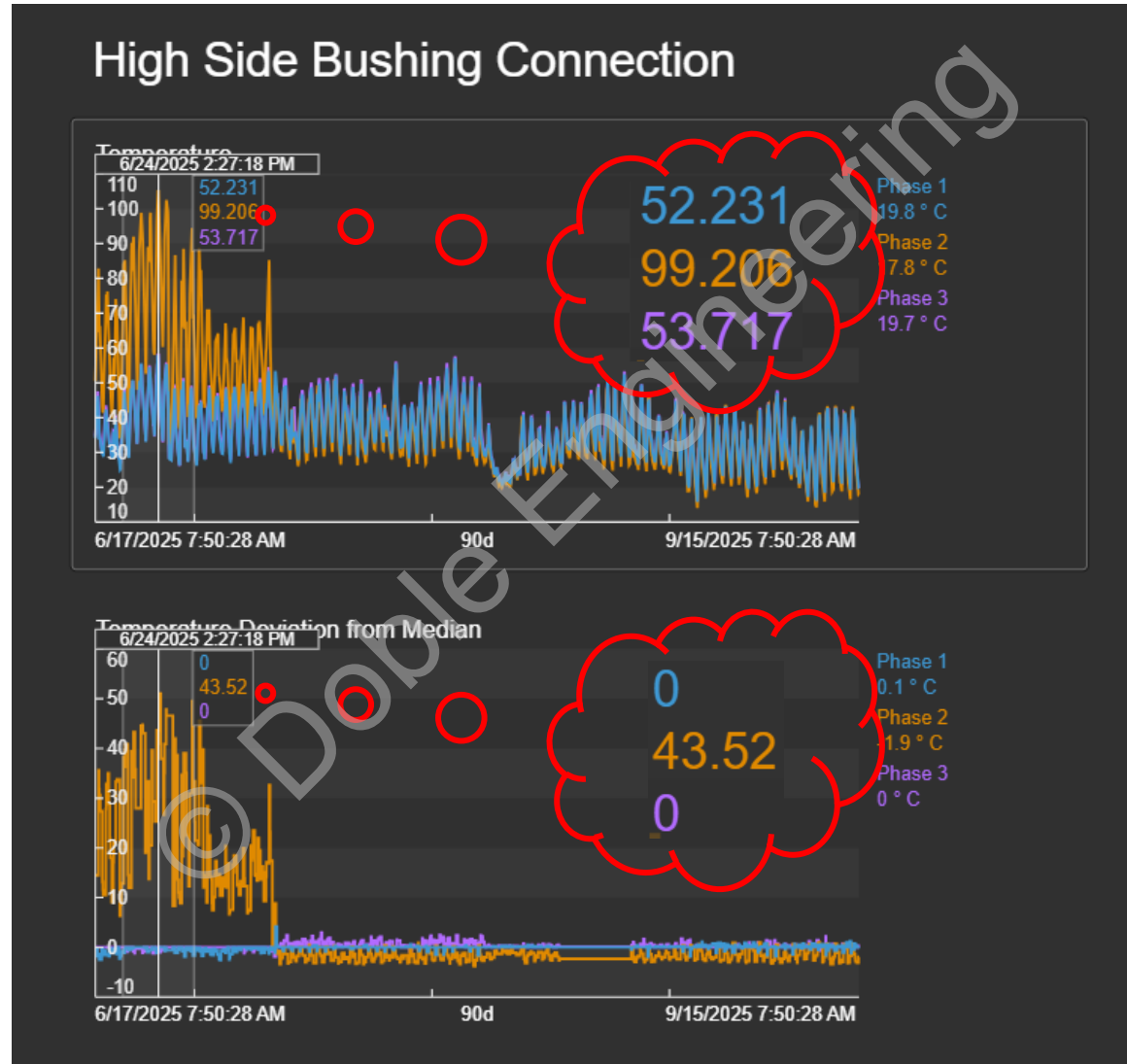
22

°C

Observation of HS Bushing Thermal Issue

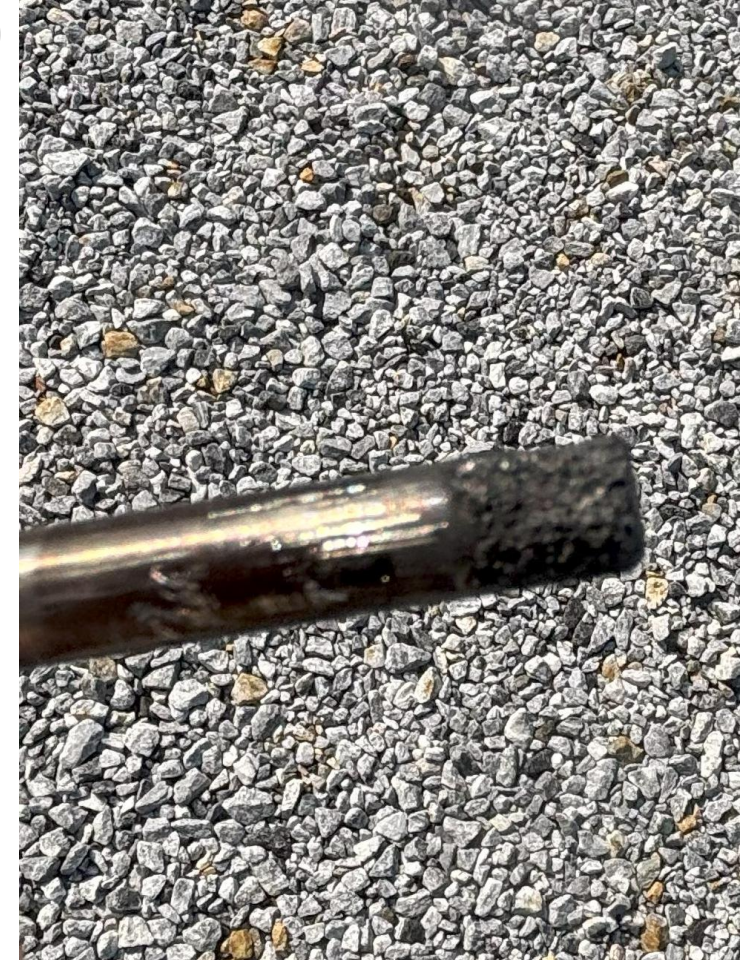
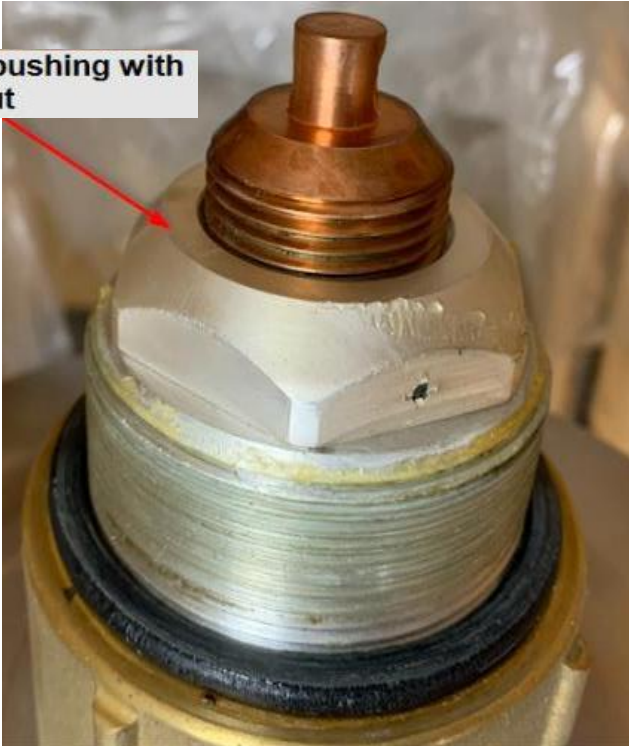


PI Data Showing Deviation of Observed Temps

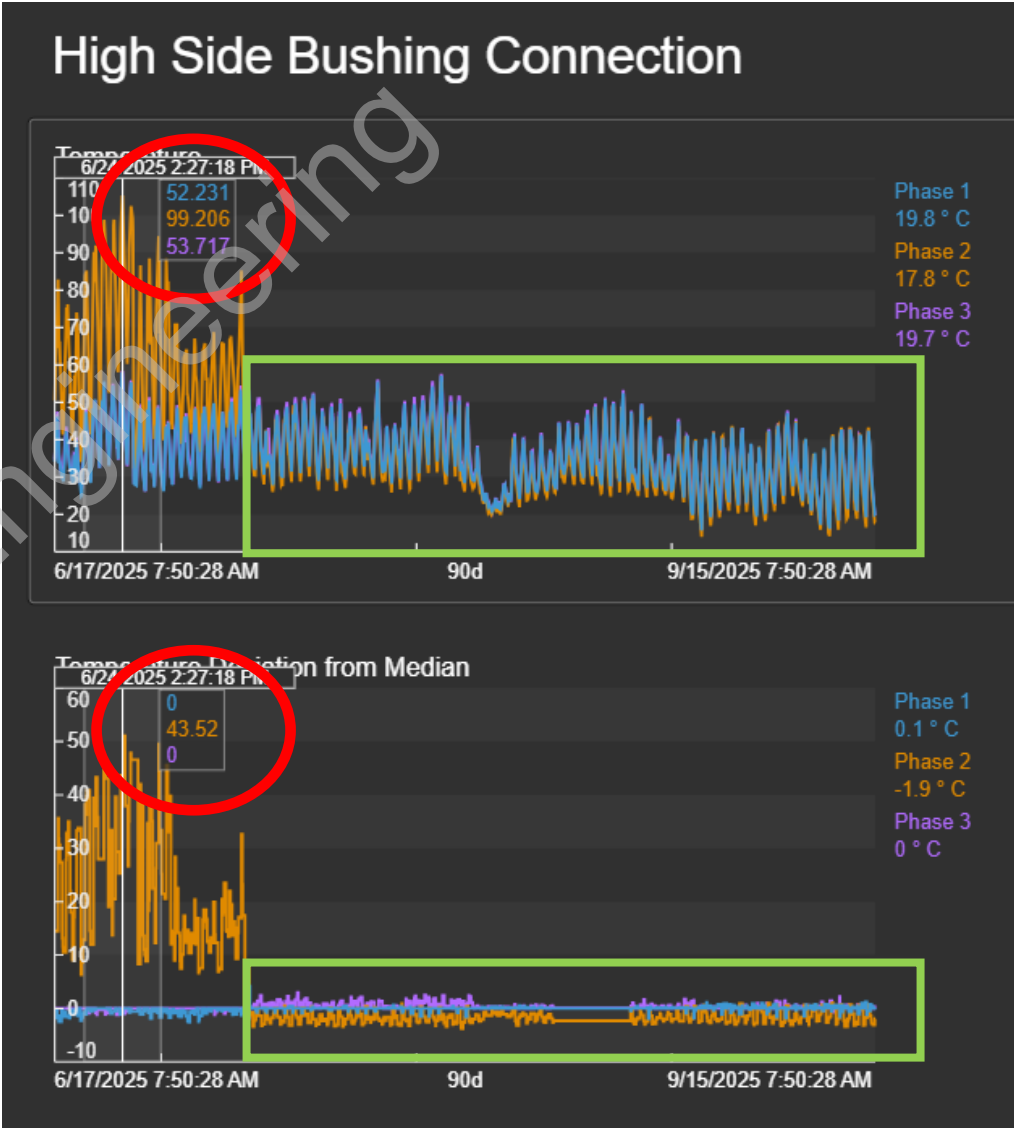


Thermal Damage Due to Loose Draw Lead Nut

Example of bushing with draw lead nut



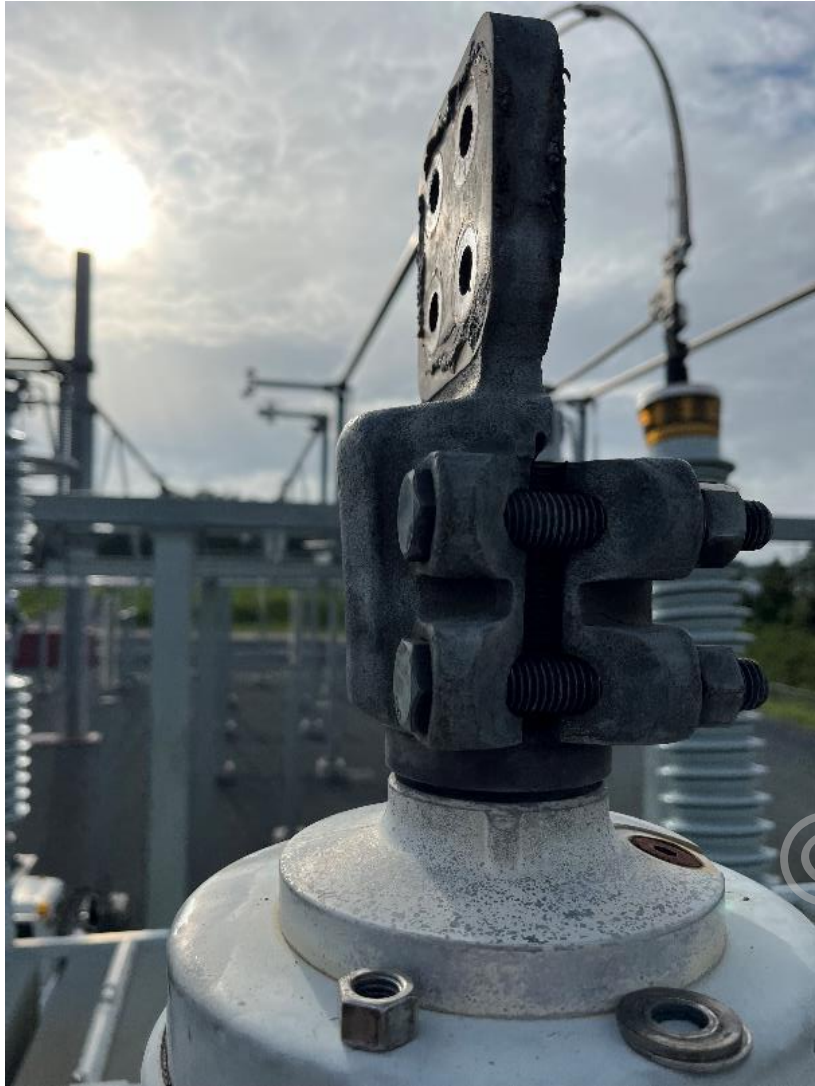
Damage to Bushing and Post Repair Thermal Data



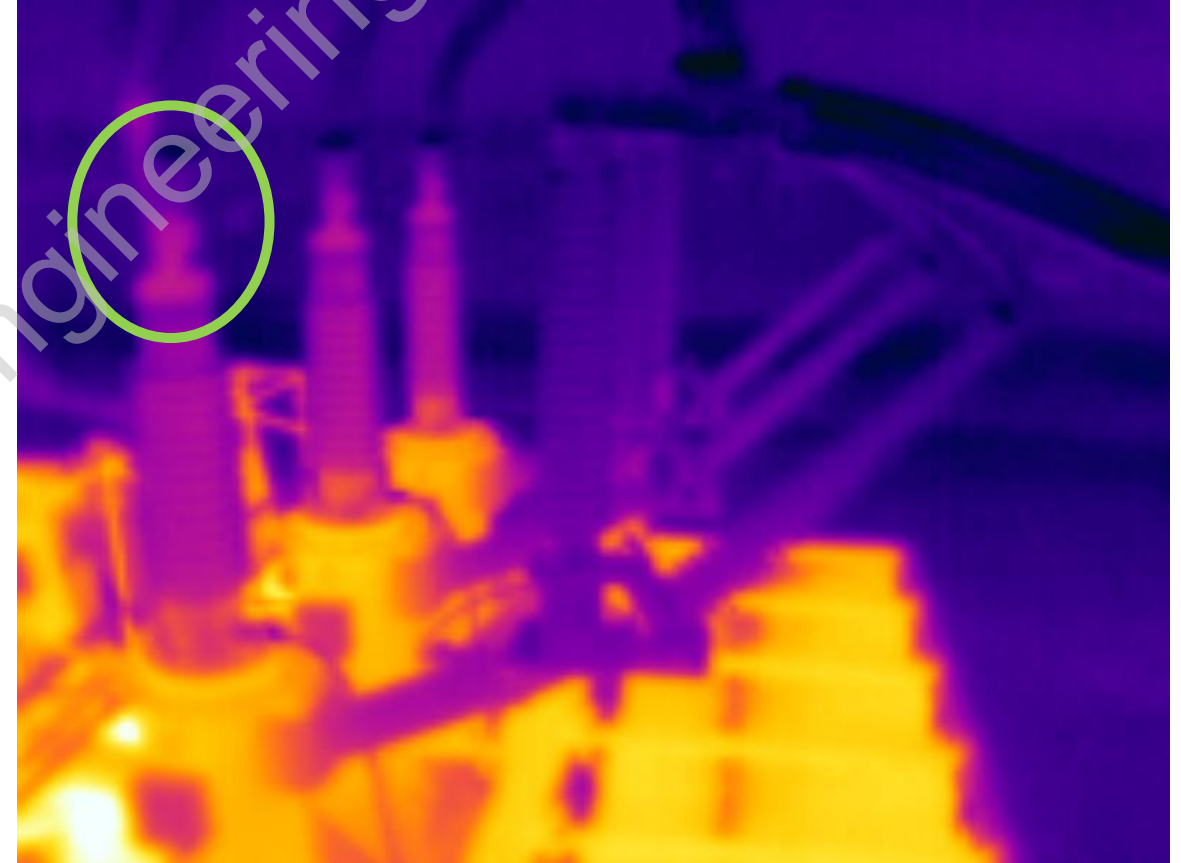
Thermal Heating Due to Loose Bushing Clamp



Thermal Heating Due to Loose Bushing Clamp



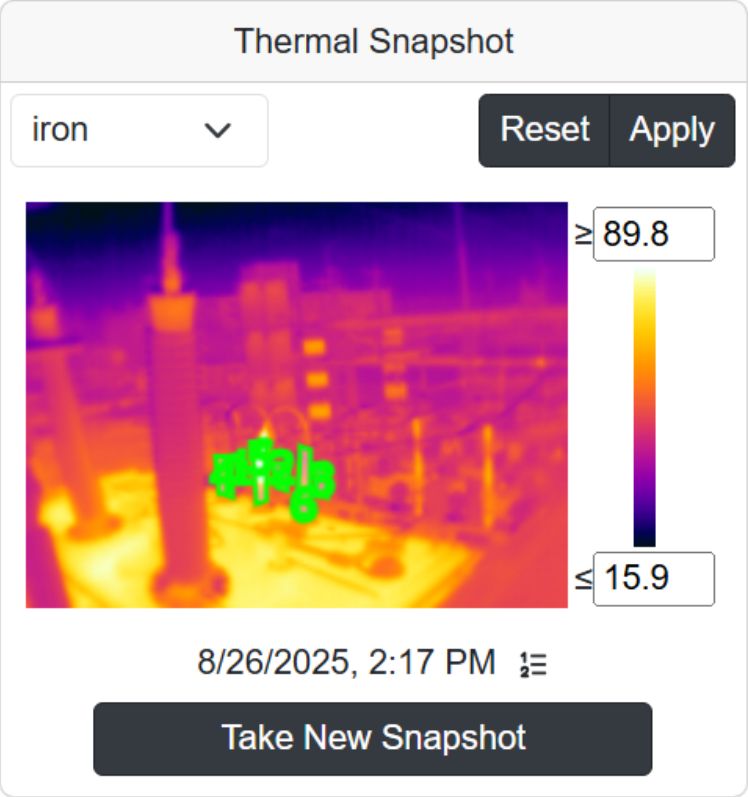
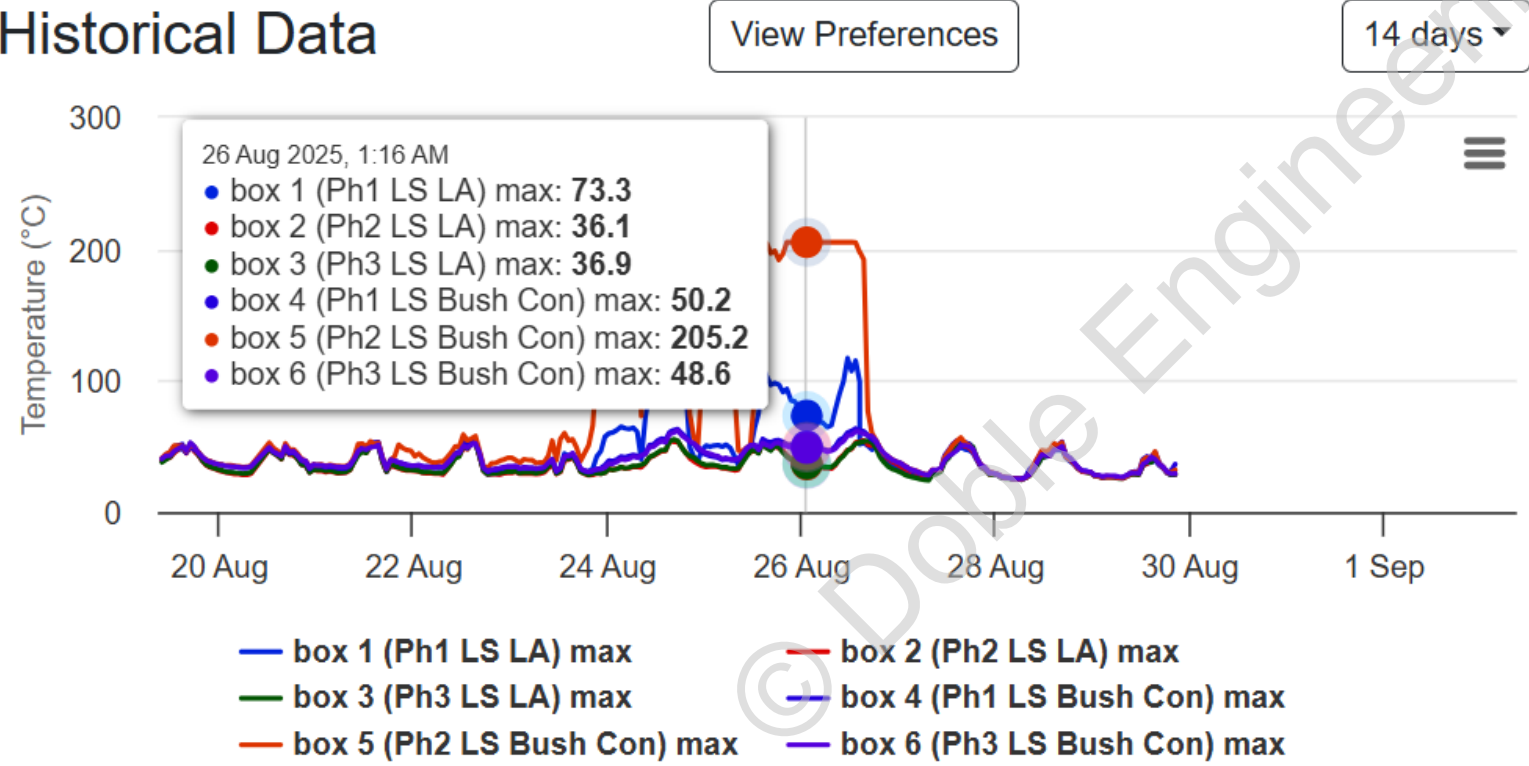
Verification of Repairs Using Camera Imagery



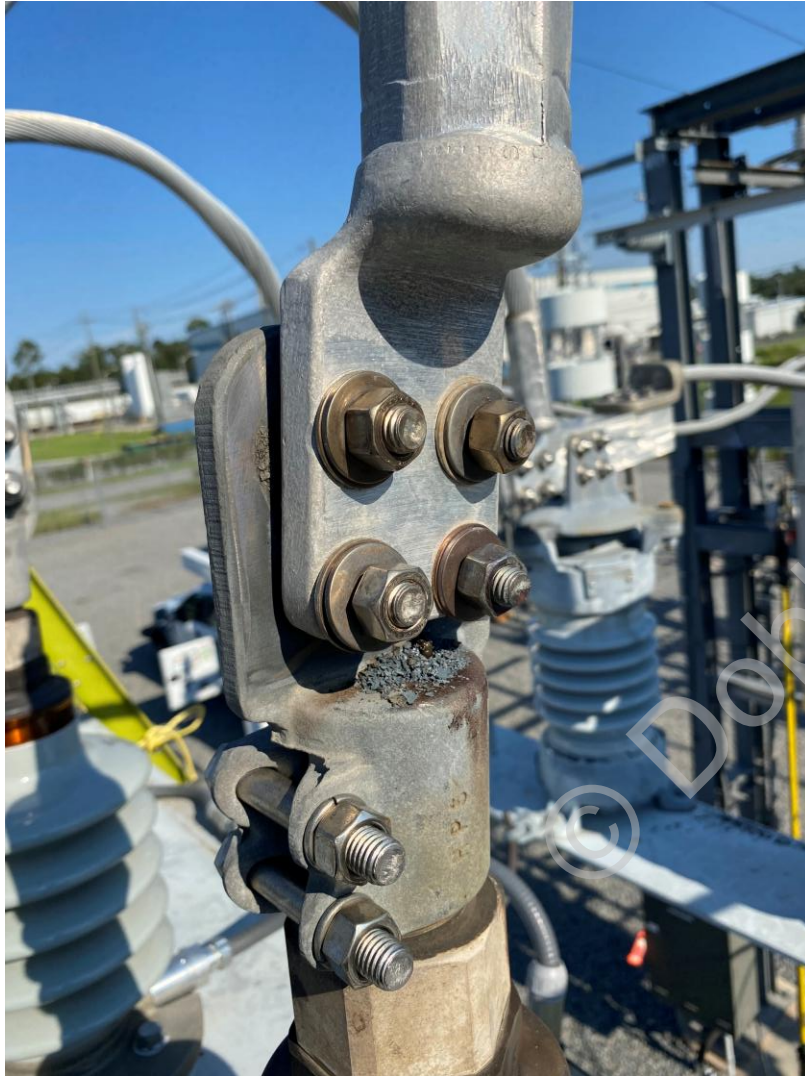
Extreme Bushing Heating Due to Loose Connection



Extreme Bushing Heating Due to Loose Connection



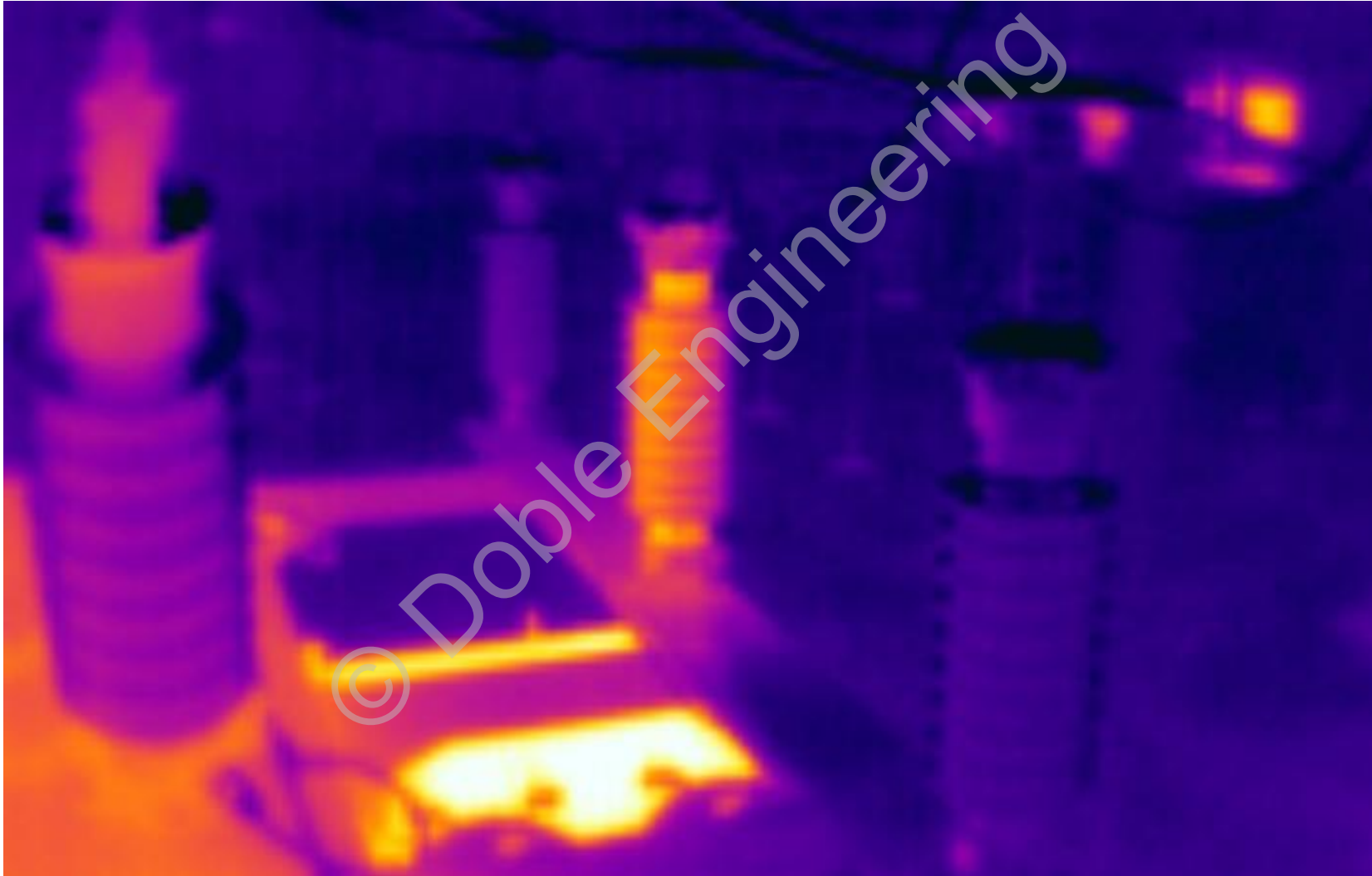
Extreme Bushing Heating Due to Loose Connection



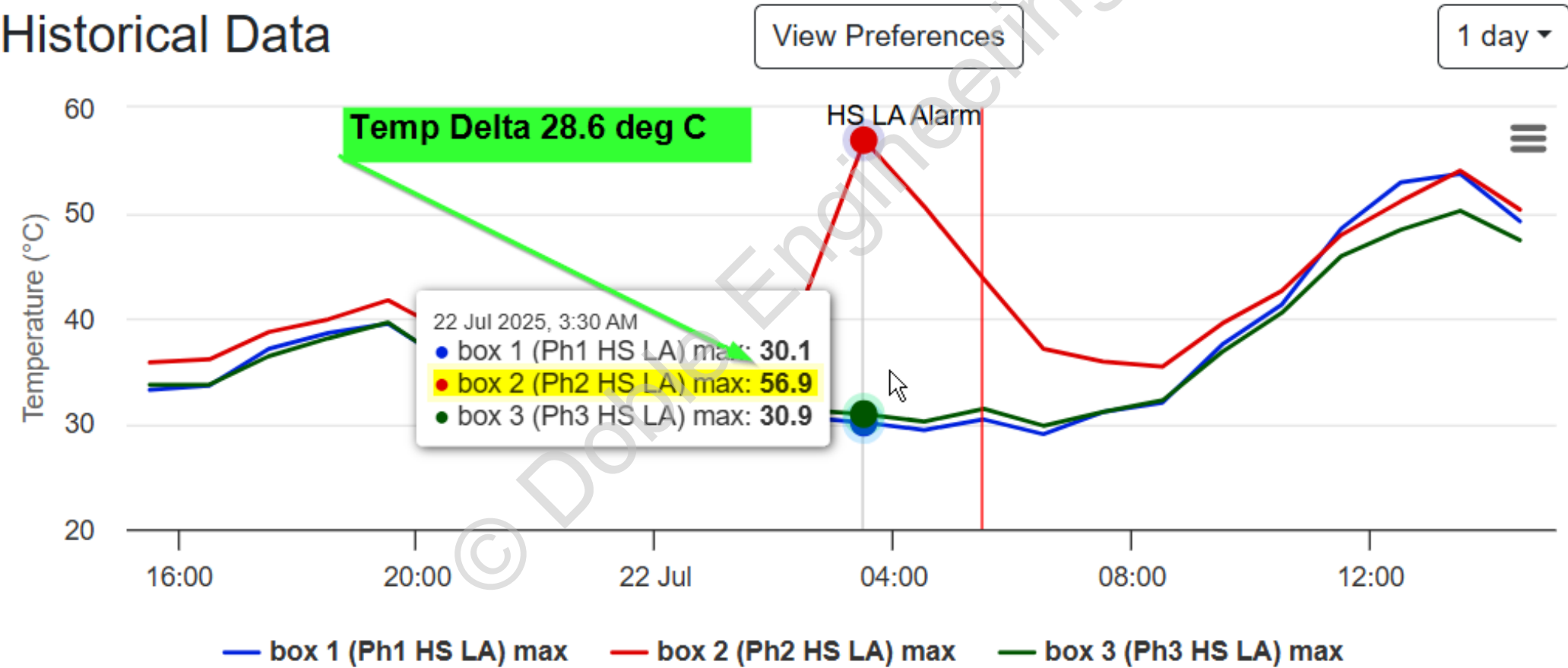
Extreme Bushing Heating Due to Loose Connection



Arrester Heating During Blown-Fuse Condition



Arrester Heating During Blown-Fuse Condition



Implementation of Temporary Camera System

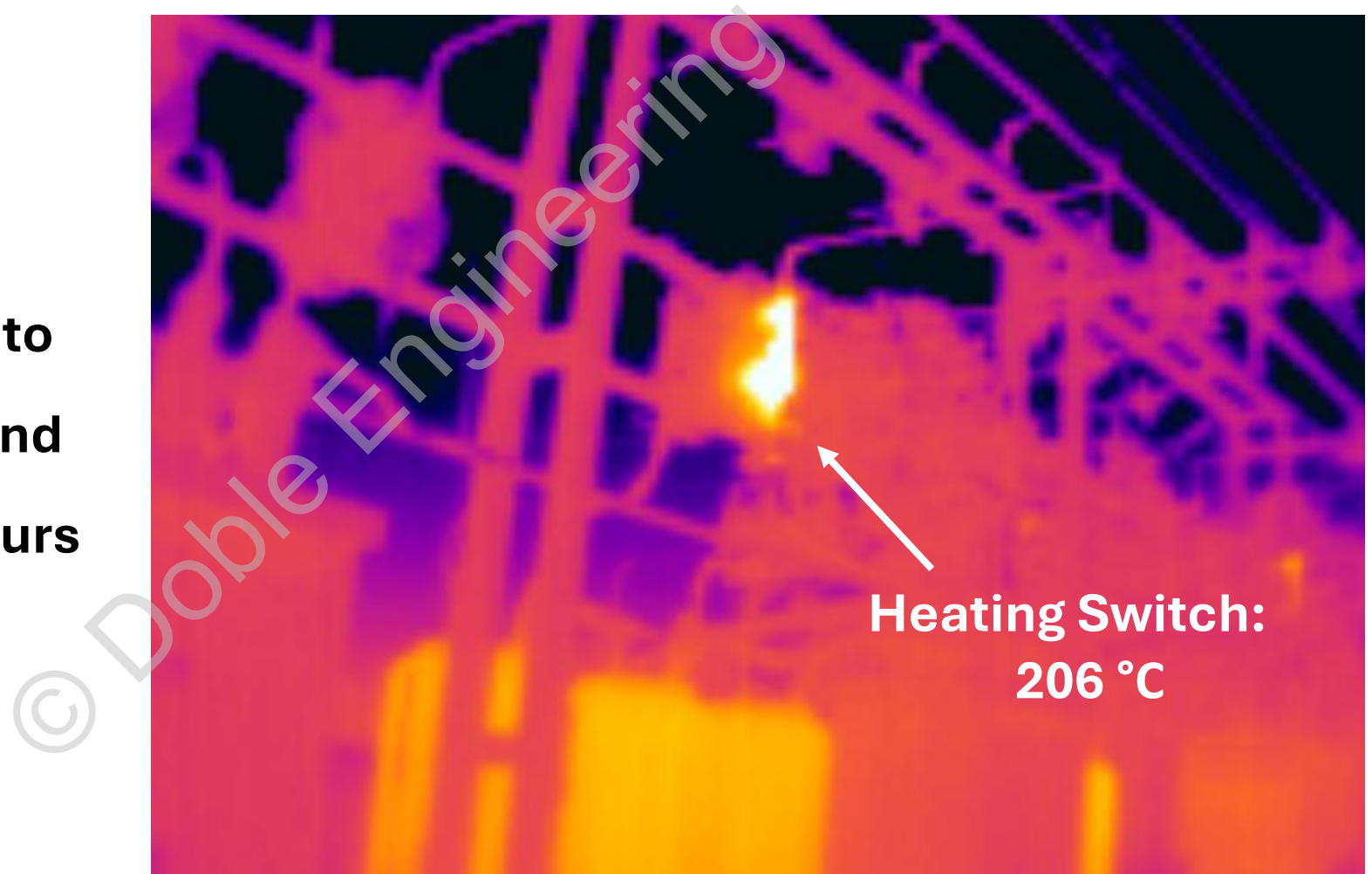
**Solar-Charged
Battery System**



**Magnetic Mount
Static Camera**

Implementation of Temporary Camera System

Camera system deployed to capture visual snapshot and measurements every 4 hours



Implementation of Temporary Camera System



Continuous IR Monitoring: Dynamic Camera System

Drew Mohundro — Mississippi Power Company

Dynamic System - Initiative Goals and Driving Factors

-  Monitoring – provide real time infrared measurements of in-service power transformers
-  Efficiency – leverage minimum camera installations for maximum coverage of equipment
-  Flexibility – design is site specific, ability to expand coverage over time (initial focus on XFMR bushings)
-  Accessibility – allow remote connectivity for in-house analysis and troubleshooting (mirrors existing CBM monitors)

Dynamic System Components



Dynamic Camera Housing

Fixed-Focal IR Lens

Variable-Focal Normal Lens

Pan, Tilt, Zoom Capabilities

Local Video Server

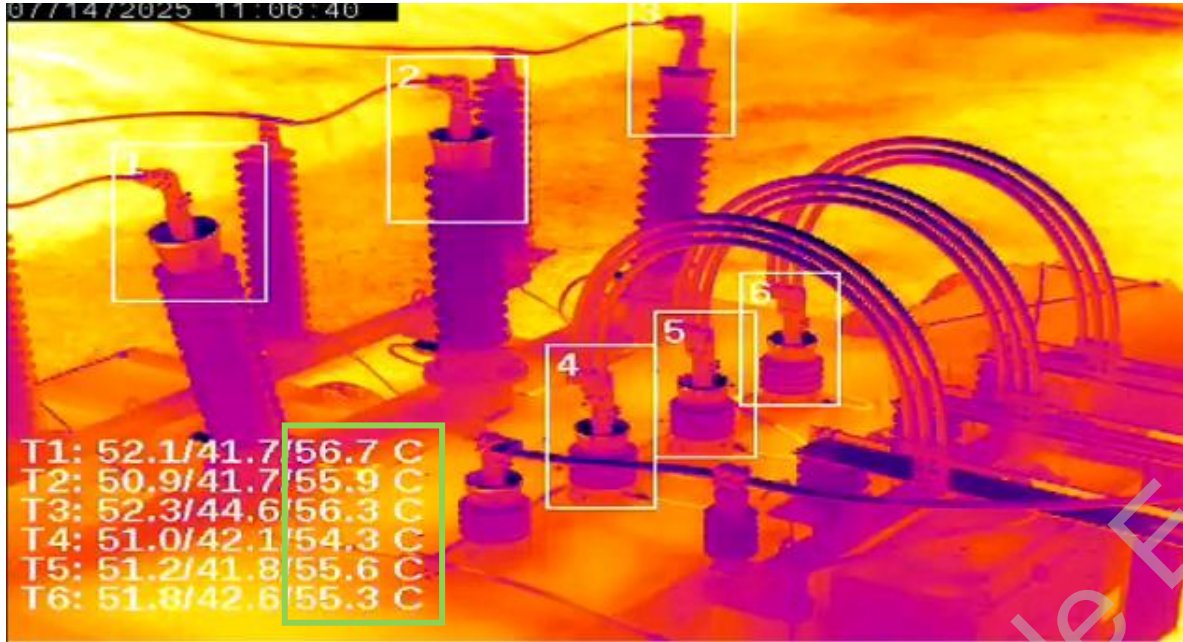
Data and Alarm Processing

Fiber Connections to Camera

Ethernet Connection to Network



Example Installation – Central Low Side Bus



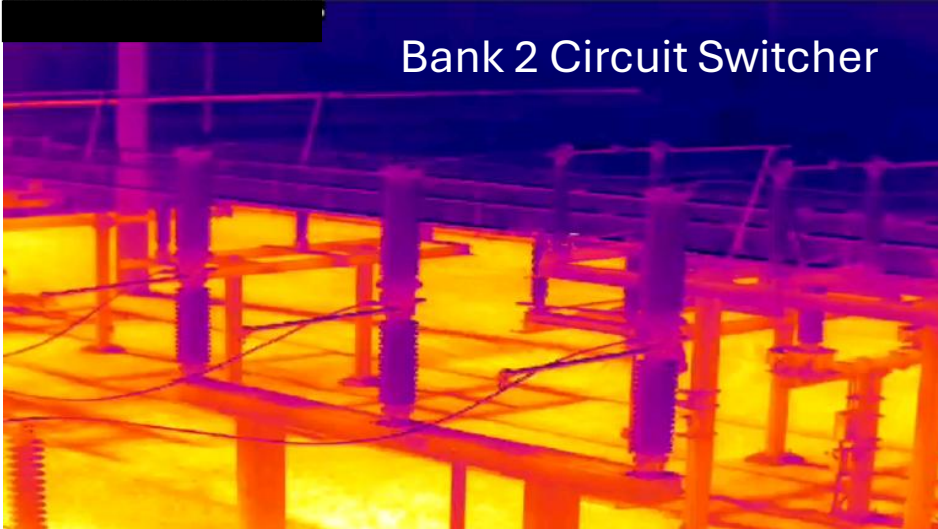
- ✓ Flexibility – camera location (low-side bus) gives vision over most of switch yard
- ✓ Accessibility – all photos were taken while remotely connected to the DVS video server, including manual camera movement

- ✓ Monitoring – Clear line of sight for each bushing and connection point
- ✓ Efficiency – able to monitor both XFMR banks with single central installation



Flexibility – Opportunity to Expand Coverage

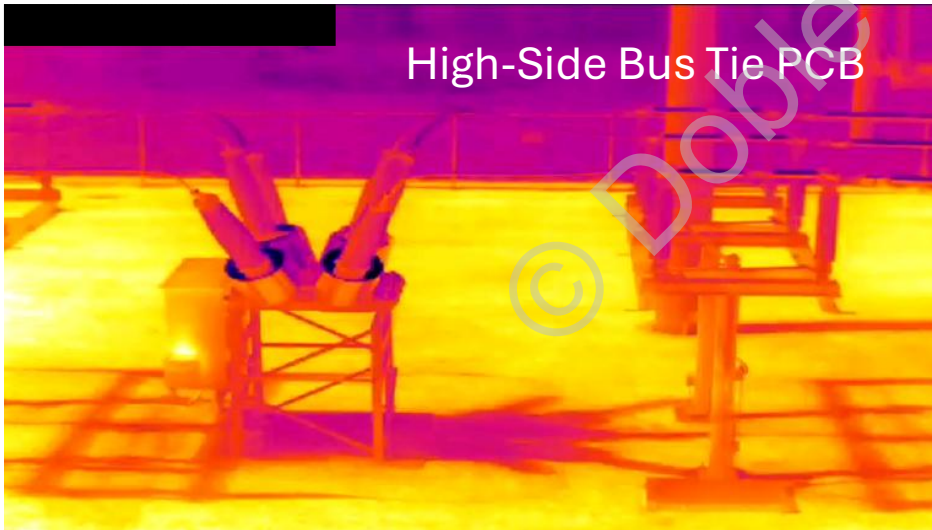
Bank 2 Circuit Switcher



Bank 1 Circuit Switcher



High-Side Bus Tie PCB



Low Side Switch Connections



Improving the Process:

26 Projects Completed, 48 Cameras Commissioned

Design Phase:

1. Prioritize using existing structures
2. Focus on central Low-Side and central High-Side locations
3. Utilize thermal drone to verify proposed camera locations

Installation Phase:

1. Verify camera serial number (fixed IR Camera focal length)
2. Confirm acceptable Line-of-Sight per design
3. Perform pre-commissioning checks

Application Phase:

1. Consider near-future equipment changeouts
2. Adjust thermal window to limit nuisance alarms

Drone Usage to Evaluate Camera Locations



Onsite Design Revisions:

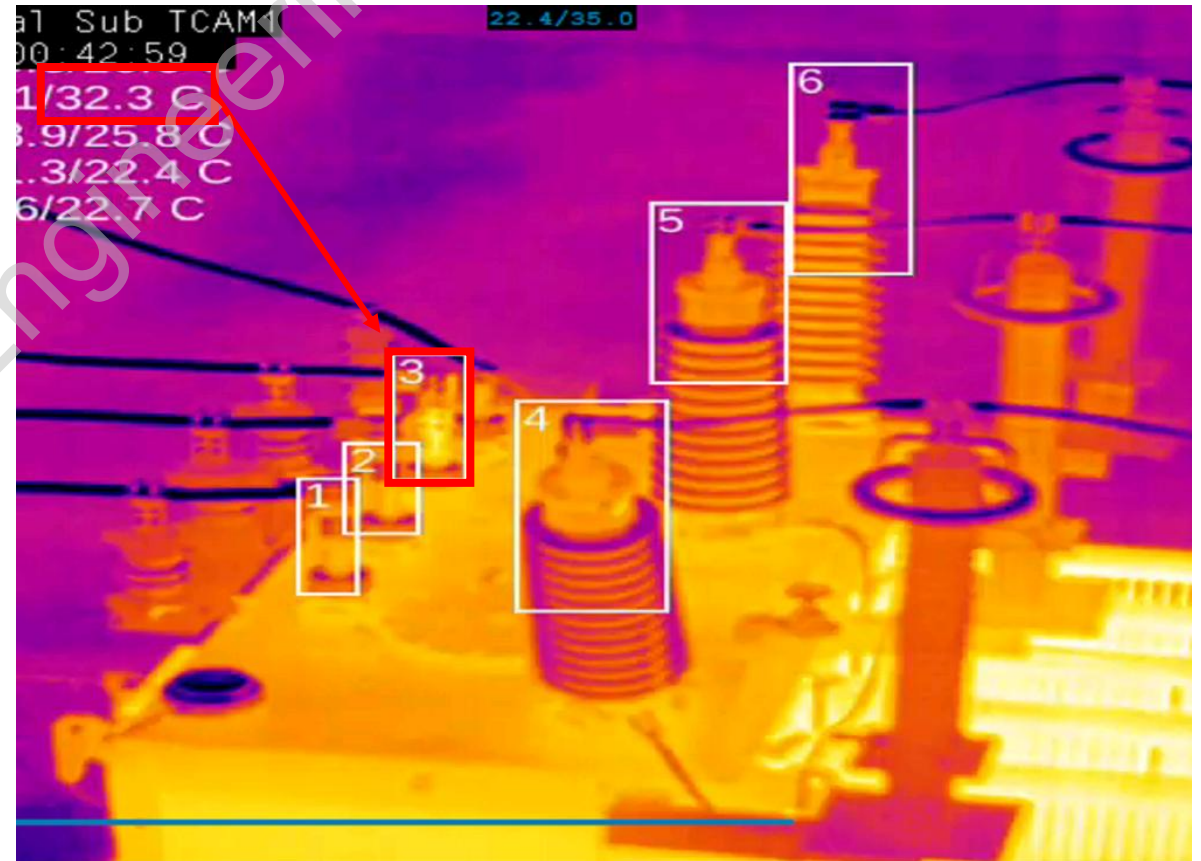
- Initial proposed location blocked line of sight to low-side bushings
- Determined new locations on foot and confirmed with thermal drone live feed
- Updated final design to reflect new, viable location

Notable Observation– Low Side Bushing Heating

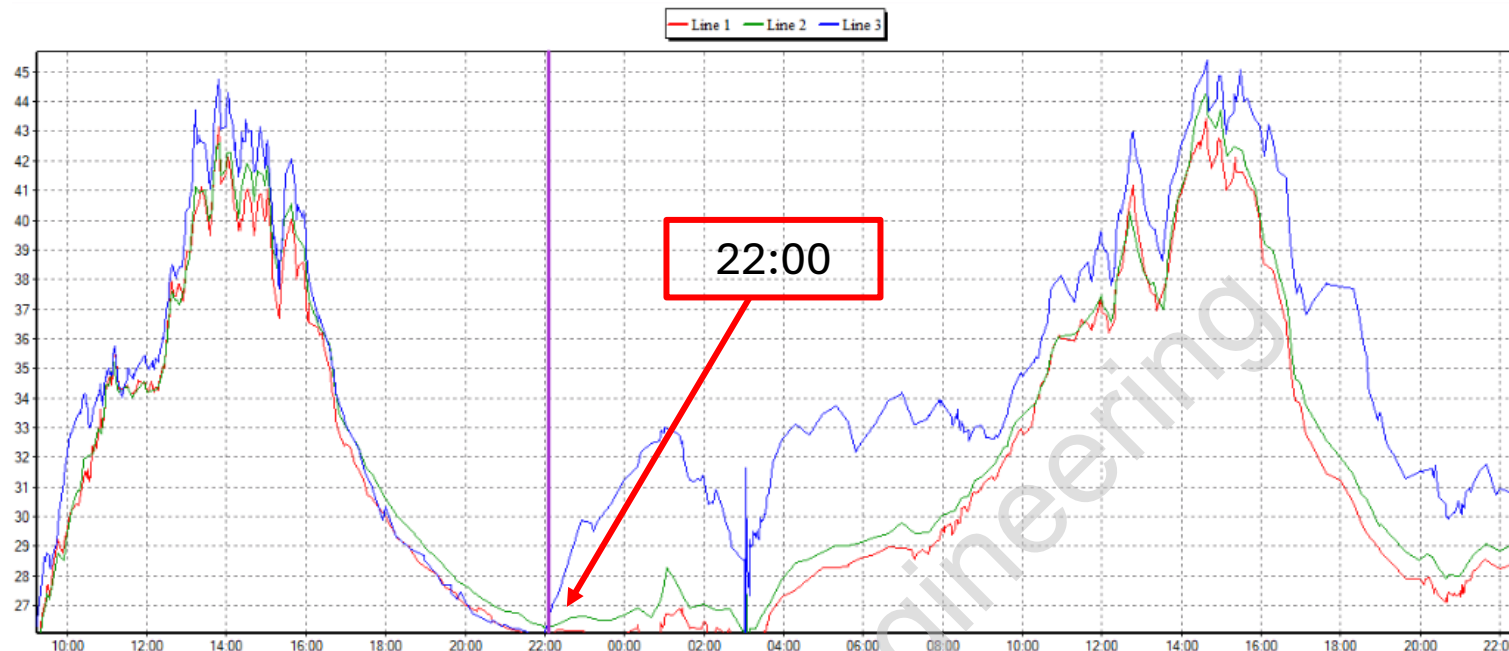
01/06/26 – 22:00



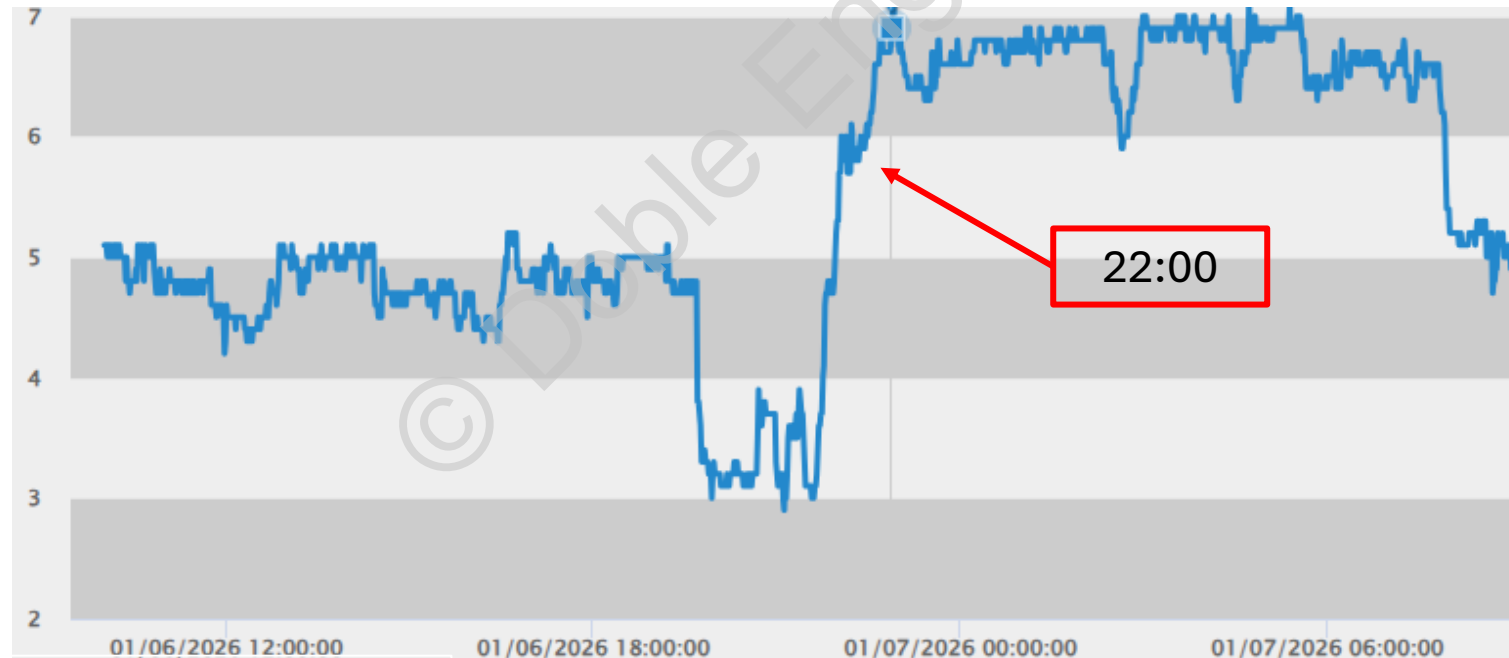
01/07/26 – 01:00



Thermal Data from Server

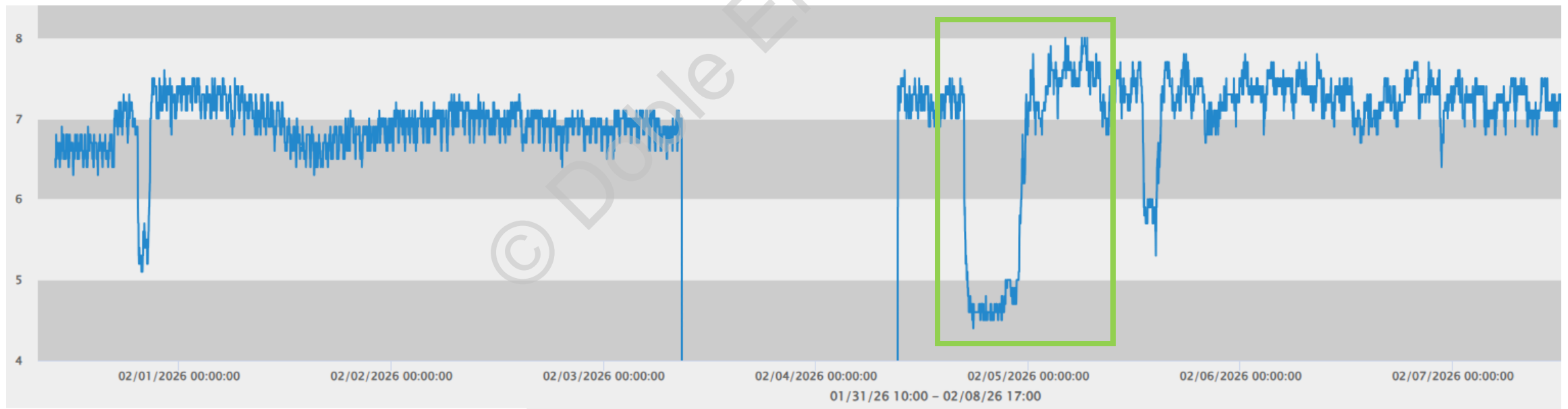
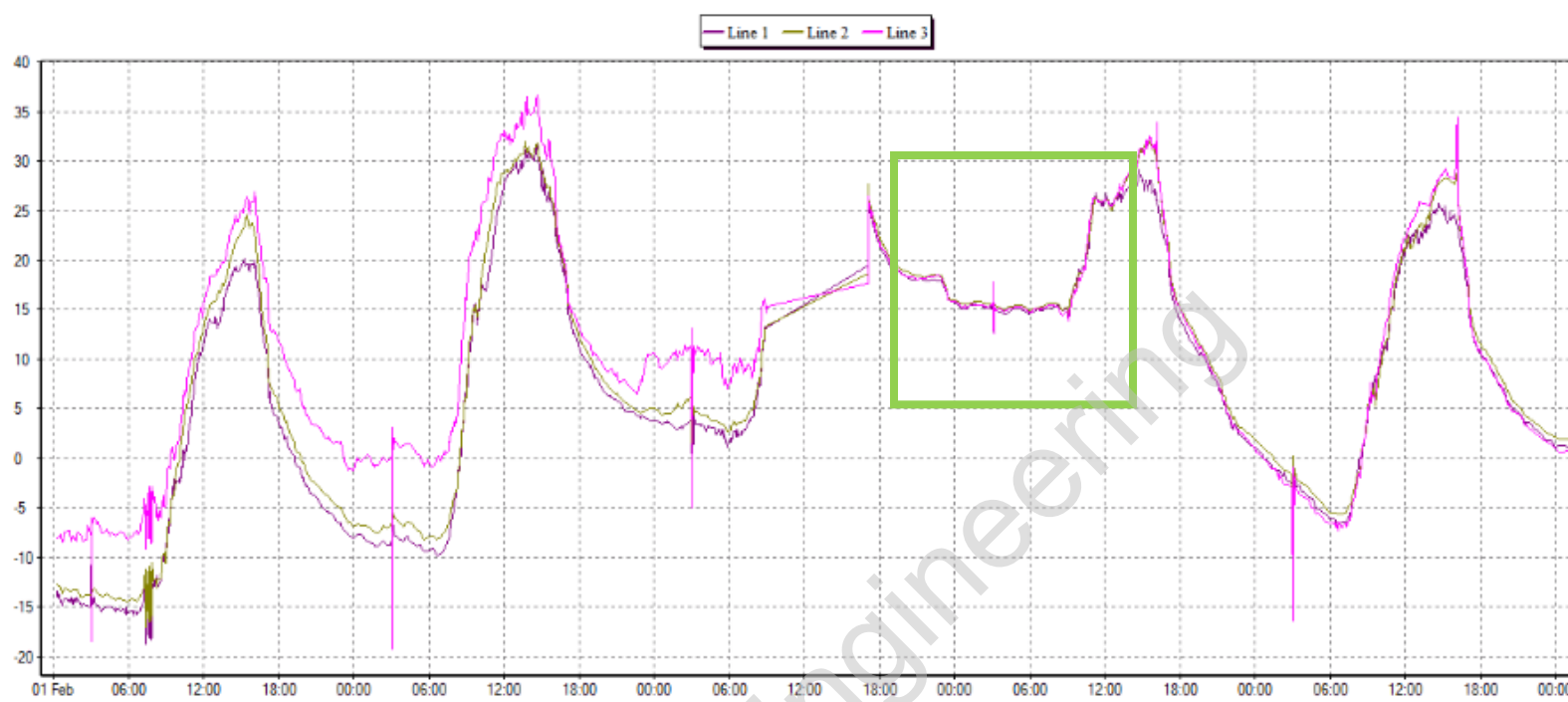


MW Load of XFMR



Notable Observation – Post Bushing Repairs Thermal Data





Notable Observation – Temperature Delta and Residue



Notable Observation – Temperature Delta and Residue



Notable Observation – 5 Months After Repairs



Notable Observation – Pre Commissioning Camera Checks



Notable Observation – Post Commissioning 20 °C Thermal Delta



Visual Comparison of Middle Phase to Outer Phase

Thermal Box T2

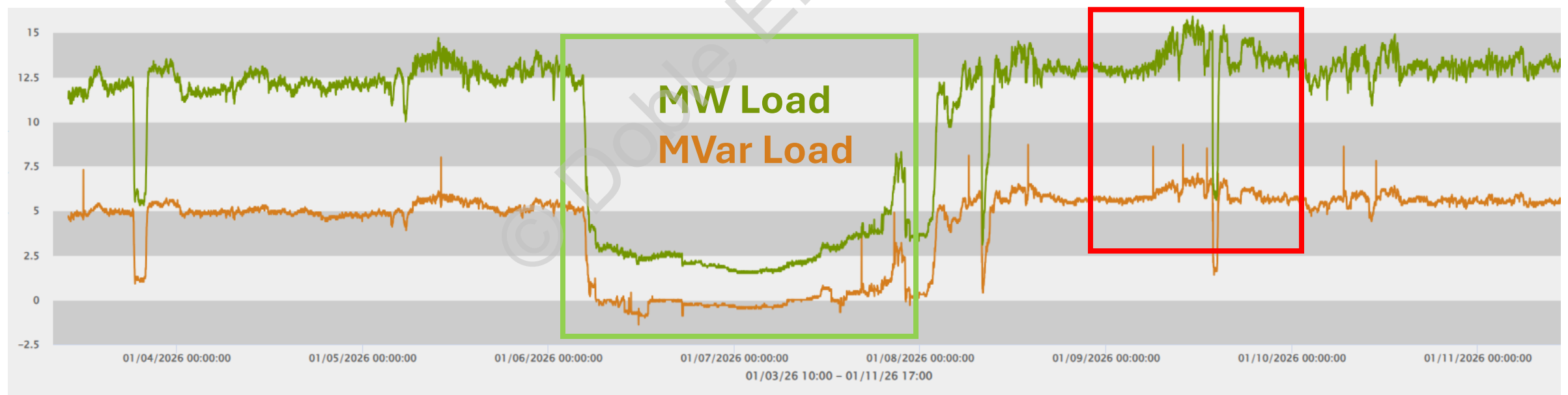


Thermal Box T3

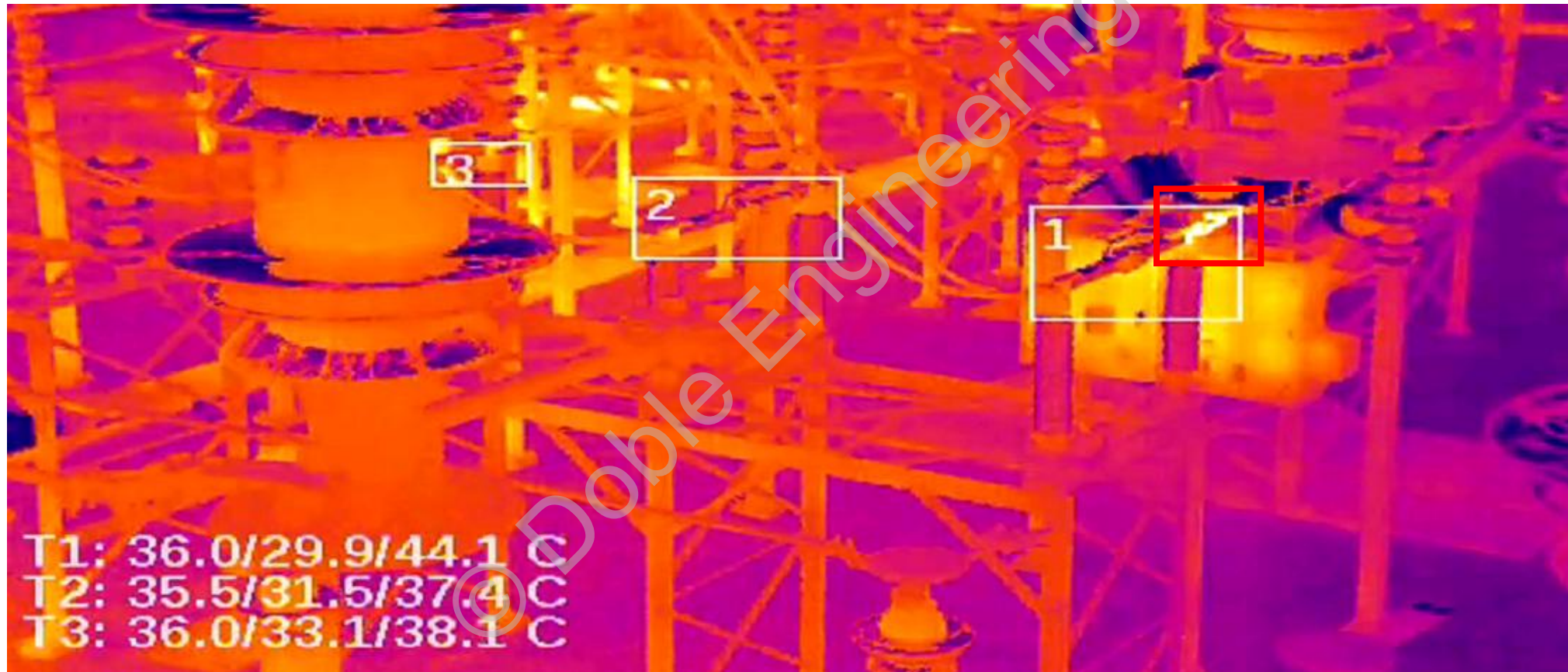




Awaiting outage to investigate further and perform repairs



Notable Observation – 7 °C Thermal Delta on Switch Connection



Awaiting further investigation and possible repairs

Next Steps for MPC Dynamic System Initiative – 2026 Goal

- Continue installation and commissioning of new dynamic systems
- **Vet new technology options from vendor for future best fit**
- **Develop DNP data stream for binary and analog points to PI Data Server**
- **Collaborate with SoCo M&D Center to implement and improve data models**
- Refine existing systems to continue reducing nuisance alarms as needed

Any Questions?

