



2026 International Conference of Doble Clients

Switch Bearing Issues and Solutions

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Brazos Electric Power Cooperative, Inc.

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Boston, Massachusetts USA



Agenda

- Switching Issues
- Identifying the Problem
- Researching Solutions
- Maintenance/Repair Strategies
- New Switches
- Conclusions

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Switching Issues

October 19, 2017



- Itasca M30 switch failed to close
 - 138 kV, 2,000 amp
 - Southern States EV-2
 - Manufactured 2006
 - HMVB
- Attempted repairs
 - Penetrating oil
 - Grease
 - Preload
- Replaced switch



Switching Issues

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Switching Issues – October 26, 2018

- Wright M70 failed to open
 - 138 kV, 2,000 amp Southern States EV-2
 - Manufactured in 2006
 - HMVB
- Norfolk M70 failed to open
 - 138 kV, 2,000 amp Southern States EV-2
 - Manufactured in 2006
 - HMVB

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Identifying the Problem

Bearing assembly



Bearing removed from assembly



Identifying the Problem

- Third party material testing
- 52100 races
- 400 series balls



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- Feasibility of field repairs
- Replacement assemblies
- Rebuilding assemblies
 - Bearing selection



- 6209-2RS ball bearings
- Steel selection
 - Corrosion resistance
 - Mechanical strength
- Mechanical calculations
 - Loading assumptions
 - HMVB
 - Other loads
 - Axial thrust
 - Radial load



Researching Solutions

440 Stainless

- Hardened with heat treatment
- Static load rating of 4,108 lbf
- Equivalent radial load of 741 lbf
- Good corrosion resistance

316 Stainless

- Cannot be hardened with heat treatment
- Static load rating of 1,825 lbf
- Equivalent radial load of 645 lbf
- Excellent corrosion resistance

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Researching Solutions

- Non-OEM parts
- Loading assumptions
 - Axial thrust is focus
- 4x weight of insulator
- Side-by-side comparison
- Rotated by hand
 - Regularly to start
 - Left idle
 - 1 year total
 - All passed



Agenda

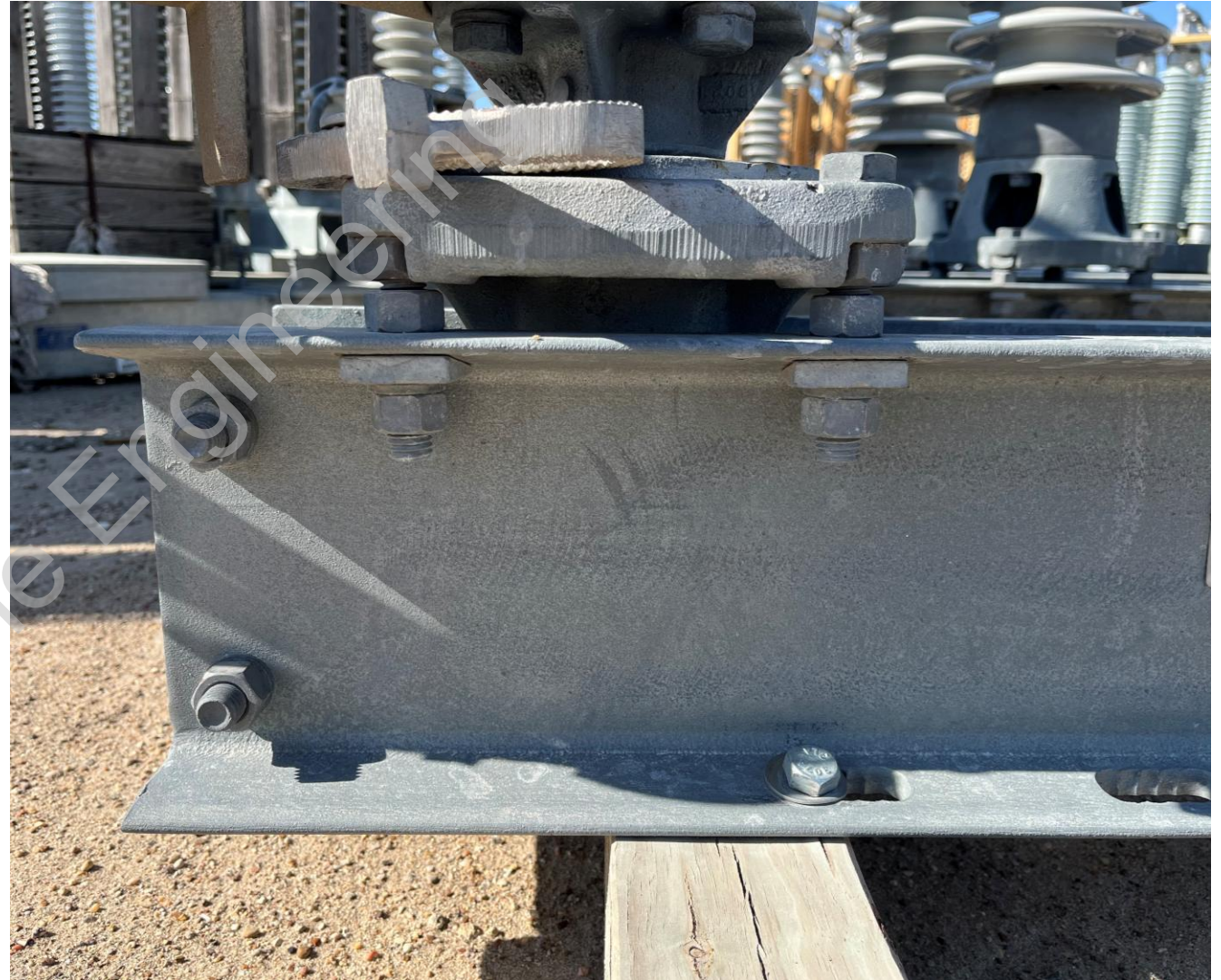
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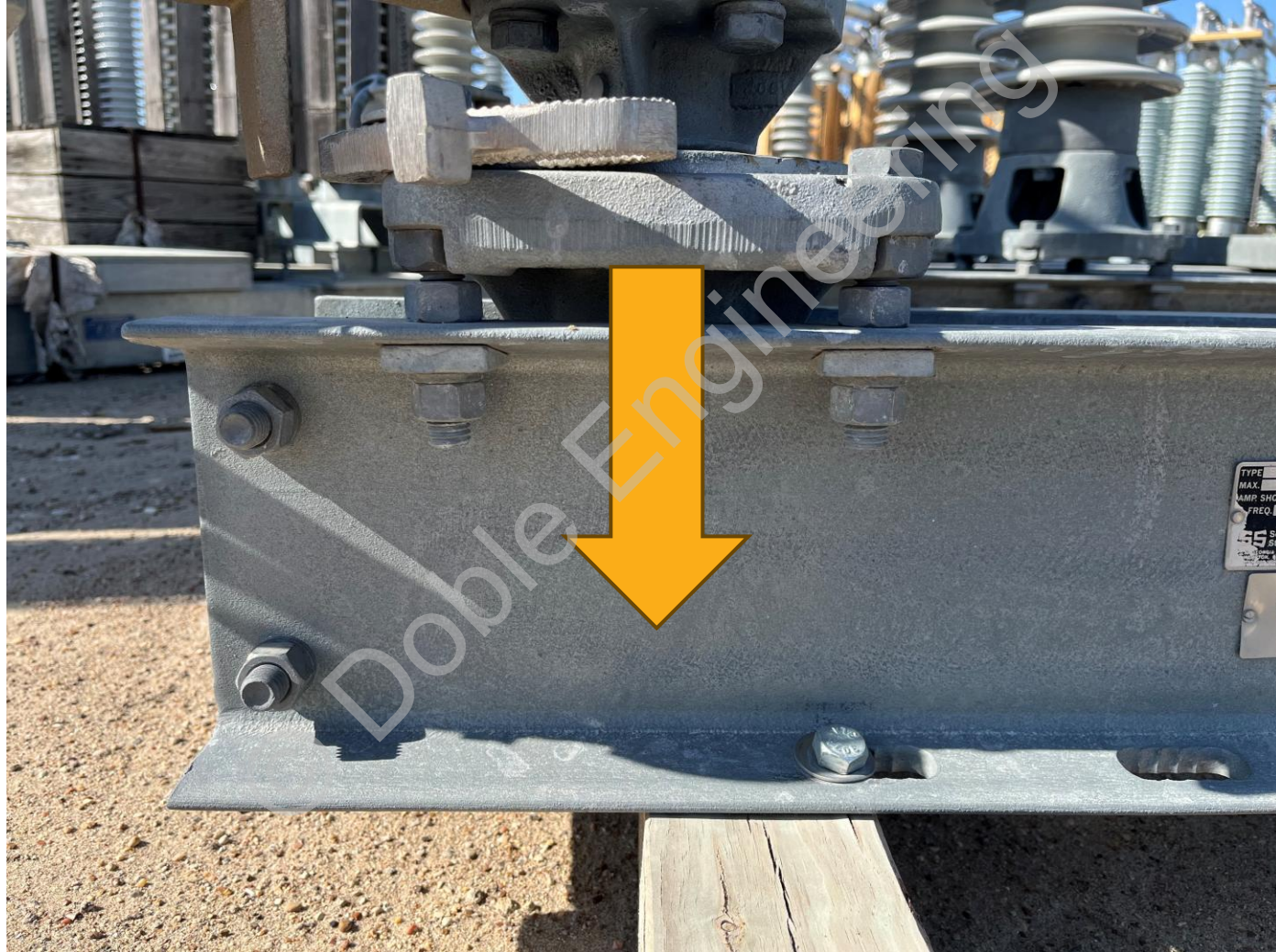
Maintenance/Repair Strategies



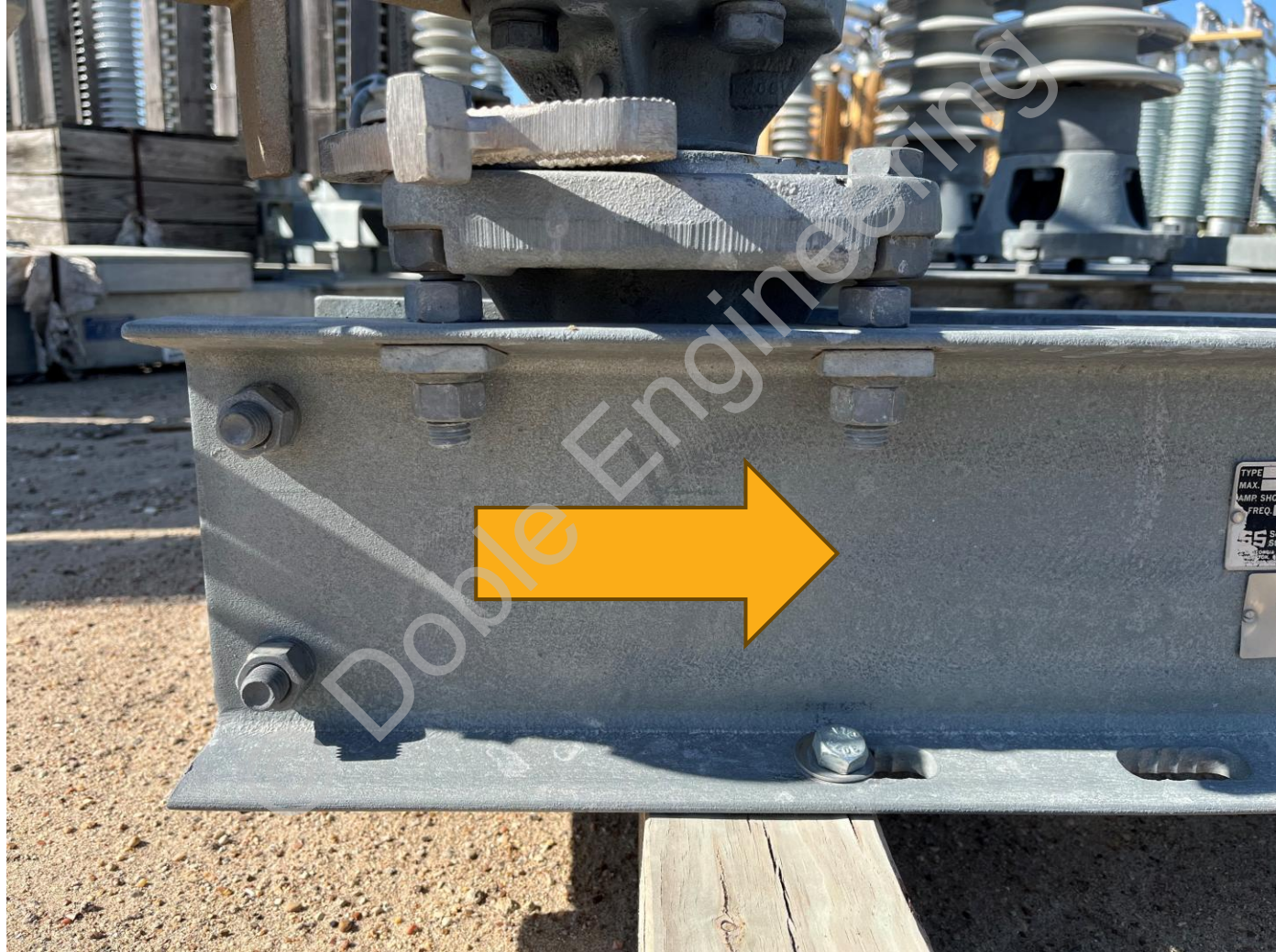
- Maintenance – routine switching
 - Be prepared to find bad bearings
 - Crew availability
 - Replacement part availability
- Repair – replace bearing assemblies in the field
 - Rebuilt assemblies
 - New EV style assemblies from OEM



Maintenance/Repair Strategies



Maintenance/Repair Strategies



Maintenance/Repair Strategies



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New Switches

- Updated purchase specifications
 - All bearing components must be stainless steel
 - Outer race
 - Balls
 - Cage
 - Inner race
- EV style bearing option for EV-2
 - Aluminum casting
 - Stainless races
 - Stainless balls
 - No seals



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Conclusions

- 96 rebuilt bearing assemblies on 32 switches installed since 2019
- No bearing failures on assemblies rebuilt with stainless bearings
- No bearing failures on EV style assemblies
- Routine switching can prevent full bearing failure and allow for planned repairs.

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Any Questions?

