



Flanders Electric – Engineering Division

Welcomes You to an

Overview of

Reconditioned Switchgear

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Reasons for Reconditioning Switchgear

Cost Savings

Reuse material

Buswork

Building/enclosure

Components

Energy Efficiencies

*Shorter Production outages often required with
switchgear upgrades*



Reasons for Reconditioning Switchgear – con't

Technology Upgrade

Obsolete Parts Replacement

Vacuum Contactors/Breakers

Solid State Protection

Web Enabled Power Monitoring Equipment
(wireless Ethernet)

Environmental Considerations

Removal of Equipment From Old Mines

More Energy Efficient Components



Basic inspections/cleanings on all components

Visually inspect for hot spots/fluid leaks etc.

Visually inspect all Connections – i.e. Power Cable Clamps (draglines)
Fuse Clips (loose, corrosion)

Meggar/Hi Pot Line and Load Conductors

Inspect Insulators, Bushings and Surge Arrestors

Thoroughly Clean Compartment

Remove: Dirt, Rocks, Excess oils, Rodent infestation

Inspect all components for excess wear and damage



*Basic inspections/cleanings on all components
(con't)*

Clean and Calibrate Electro-Mechanical Protection Devices
(if not being replaced)

Oil Analysis where necessary

For Load Break Switches

Adjust and lubricate linkages as necessary



Technology Upgrades Typically Recommended

Change OCB's (Oil Filled Circuit Breakers) to Vacuum Circuit Breakers

Replace Capacitive Trip Devices – Depending upon Age

Change Electro-Mechanical Overload protection devices to Solid State – Improve Repeatability and Accuracy



Technology Upgrades Typically Recommended (con't)

Replace old lighting with more energy efficient lighting

- High pressure sodium or Metal Halide on outside
- Replace incandescent lights with fluorescent bulbs in sockets

Replace low voltage, air contactor size 4 and above with vacuum contactors and any medium voltage with vacuum contactor

- Improves contactor life (number of cycles)
- Minimizes effect of environmental elements on contacts



Safety Related items – must do

Simulate all Ground Faults

Upgrade all receptacles to GFCI type

Repair all door interlocks per MSHA

Install new safety signage/warning labels

Check Ground Monitor (Coal Mines)



Standards Followed

National Electrical Code

UL/c UL – Underwriters Laboratory

EIA RS821 – Electronics Industries Assoc.: Construction Standards

Mining Safety and Health Administration

ANSI – American National Standards Institute

NFPA 79 – Electrical Standard for Industrial Machinery



Just a few examples



Example # 1 Medium Voltage Pump Sub

Specifications

7200/480Y, 225KVA

Description of operation - Transformer and Breaker to Feed Pumps for
Water Removal



Example # 1 Medium Voltage Pump Sub Summary

Material Cost \$6,500.00

Repair Load Switch

Replace two 480VAC Breakers

Labor cost \$1,200.00

Total Cost \$7,700.00

Estimated Cost of new \$30,000



Example # 2 OCB – Vacuum Retrofit

Specifications

Voltage: 7200VAC

Current: 400 Amp

Description of Operation – Dragline Contactor for Motor Starting with
Overload and Ground Fault Protection



Example # 2 OCB - Vacuum Retrofit Summary

Material Cost \$9,000.00

Labor cost \$1000.00

Total Cost \$10,000.00 Estimated Cost of new
Switchgear: \$55,000.00

Other Savings/Benefits: Installation of new contactor
during normal outage time.



Example # 3 Portable Breaker House

Specifications

Voltage: 4160 VAC

Current: 1200 Amps

Description of operation – Converted 7200VAC Portable Breaker House
to 4160 Line Drop Station



Example # 3 Portable Breaker House Summary

Items Replaced

- (2) Potential Transformers (PT's)
- (3) 5kV Bushing Assemblies

Material Cost \$5,000.00

Labor cost \$8,000.00

Total Cost \$13,000.00

Estimated Cost of new \$50,000.00



Example # 4 - 3 Way Switch House

Specifications

Voltage 7200 VAC

Current 400 amps

Description of operation - Switches to Provide Alternative Feed for Distribution. Single Main to 3 feeds



Example # 4 3 Way Switch House Summary

Material Cost	\$900.00
Mechanical Interlocks Calibration	
Labor cost	\$1,000.00
Total Cost	\$1,900.00
Estimated Cost of new	\$25,000.00



Example # 5 Large Portable Substation

Specifications

Voltage 23,000VAC

Current 1000 amps

Description of operation - Power Feed and Distribution to Dragline



Example # 5 Large Portable Switchgear Summary

Items Replaced

Replaced 25KV OCB Contacts and Changed Oil
Ground Monitor
GE Potential Transformer

Material Cost	\$16,000.00	(includes purchase of used skid)
Labor cost	\$11,000.00	
Total Cost	\$27,000.00	
Estimated Cost of new	\$75,000.00	



Questions ???

