

# Energy Storage System

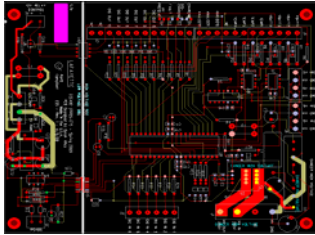
LPRDS-ETS 2009

## Functionality

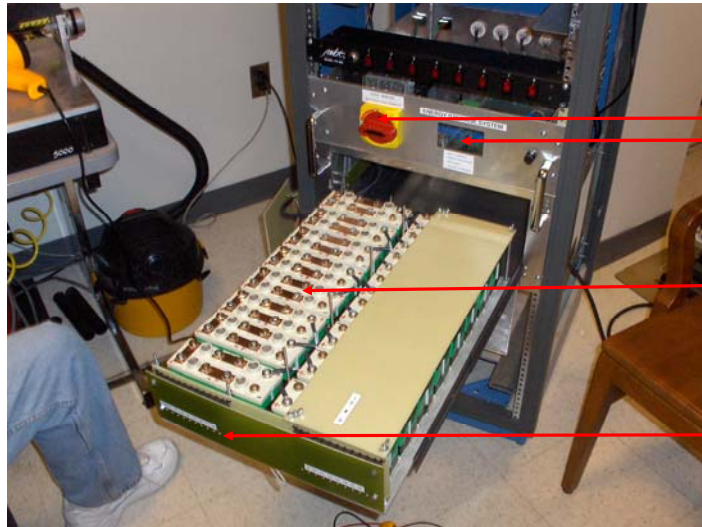
- Stores 2KWh of power
- Supply inverter with HV DC power
- Supply system power (12V and 5V) to LPRDS-ETS

## Design

- Array of 64 series connected LiFePO4 Battery Cells
- 205V nominal operating voltage @ 10Ah
- Safer and more robust than other battery technologies

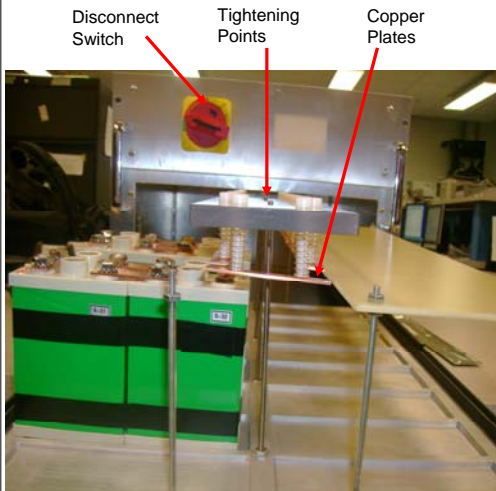


PCB Board in PADS

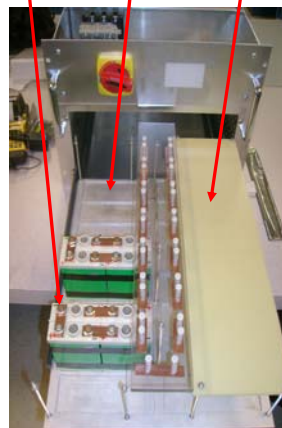


- Disconnect Switch
- Window and Indicator LEDs
- Batteries
- Test Points

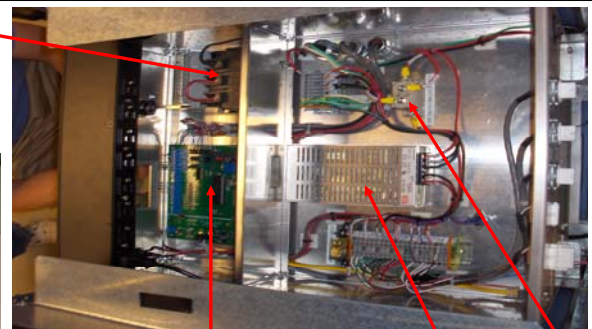
## Implementation



- Disconnect Switch
- Tightening Points
- Copper Plates



- 12.8V Pack
- Slot for 12.8V Pack
- Shield



- Disconnect Switch
- ESS PCB w/ PIC and supporting hardware
- System Power DC/DC 12V
- Safety Relay

- One PCB board designed in PADS
- Made off-site by 4pcb.com
- Clever Battery mounting mechanism prevents any voltage over 14.8V being exposed when working on battery packs

## Conclusion

- ESS successfully supplied over 15A of current at 205V to a load.
- ESS also successfully supplied the LPRDS-ETS with system wide 12V and 5V to power for powering PCBs, safety circuit, and other low voltage circuits.

## Next Steps:

- Implement Battery Management System (BMS) to increase charging and discharging efficiency and to improve lifespan of batteries.
- Redesign the voltage sensors to accommodate a wide voltage range to avoid mis-wiring.
- Need a voltage ramping circuit to protect EDS from a current surge from batteries when the disconnect switch is turned on

