

ILC RTML Meeting

EDR Planning for Magnet Power Systems

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Topics

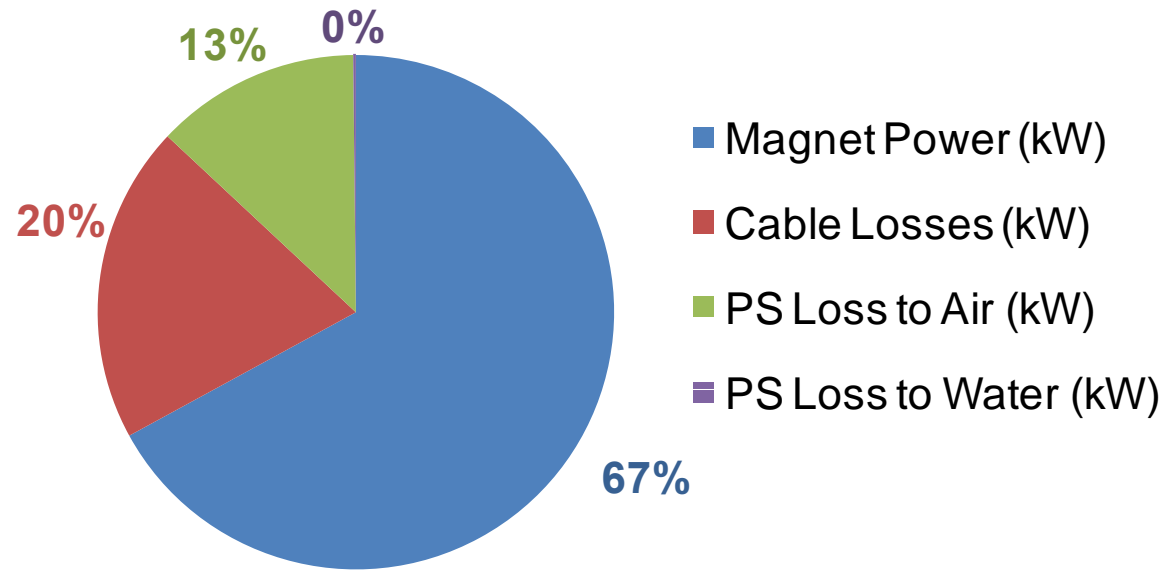
- Scope is DC and pulsed magnet PS and associated controls
- Overview of the present systems
- EDR areas for M & S cost reductions
- EDR Work Package status

Overview of Present Systems

Area	Magnet Quantity	Power Systems							
RTML	4,334	3,832							
Section		Rack Mounted		Free Standing					
		Small < 2.5kW	Intermediate 2.5 ≤ kw ≤ 30	Large 80kW	Redundant	Normal temperature	Super conducting	Unipolar	Bipolar
e-	2,167	1,739	176	1	1,916	1,842	74	864	1,052
e+	2,167	1,739	176	1	1,916	1,842	74	864	1,052
Subtotals		3,478	352	2	3,832	3,684	148	1,728	2,104

- 3,850 individually powered magnets, 484 on strings
- Rollup as of 12/2006 (52 pulsed magnets / power supplies not included)

Power Loss Distribution



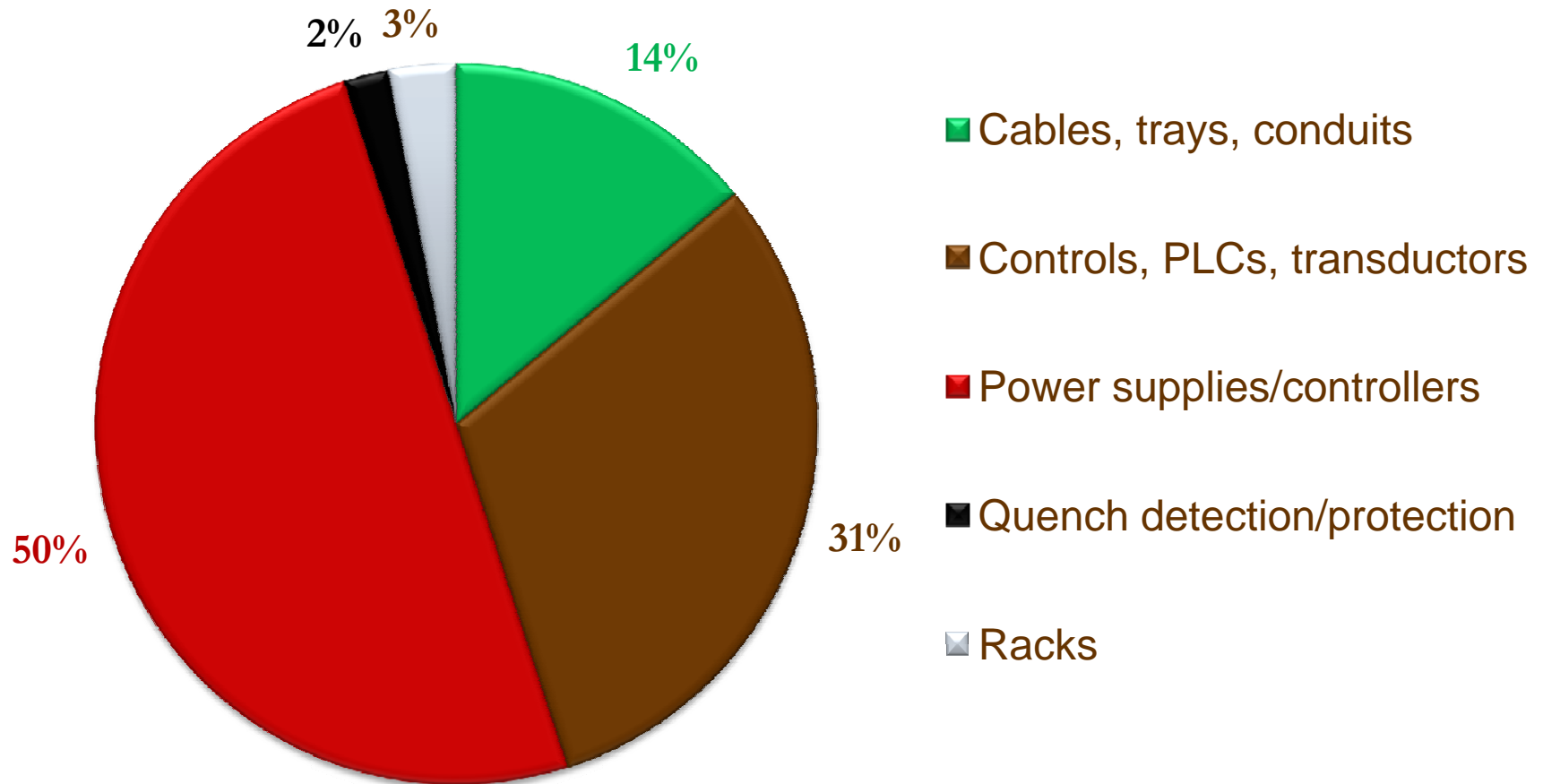
Area	Magnet Power (kW)	Cable Losses (kW)	PS Loss to Air (kW)	PS Loss to Water (kW)	Sum of All Losses (kW)	Expected Running kVA
e-	1,588	471	305	4	2,368	2,786
e+	1,588	471	305	4	2,368	2,786
RTML	3,176	942	610	8	4,736	5,572

- All air cooled cable, 8 – 4000A spin rotators are candidates for WC cable
- 100m² of floor space needed. Does not include system considerations, clearances for safety, maintaining equipment, etc.

M & S Costs Estimate Bases

M&S=53% of total estimated RTML Power System cost

Distribution of RTML Power System M & S Costs

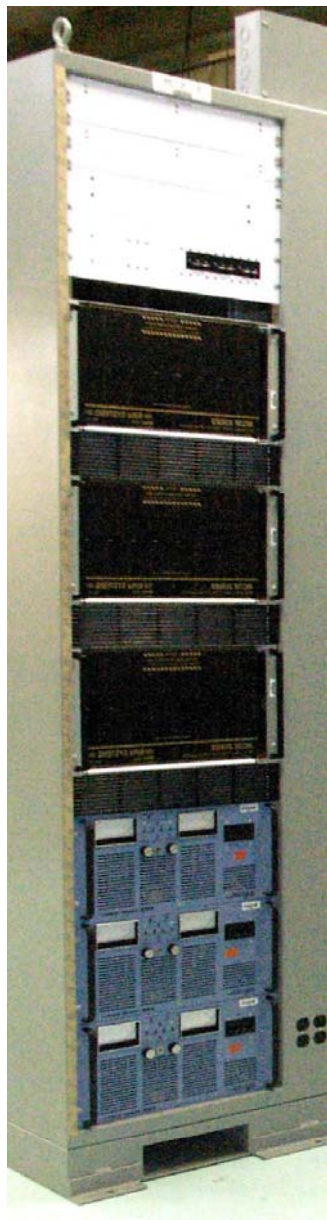


EDR Issues

Areas of cost reduction

- 4,334 magnets – 3,832 power supplies. More magnets on strings to reduce power supply and controls quantities/costs
- Many small power supplies – no differentiation in stability requirements. All have two expensive, zeroflux current transducers. Define stabilities to eliminate transducers, use something less expensive
- 2,000 20V, 10A bipolar power supplies. If zero flux transducer not required, PS much smaller and modular. See next slide
- Not a cost reduction issue, but power supply designers need magnet inductances for control loop tuning, for modulated systems (BBA, FF correctors, etc) and for SC quench energy dissipation system design

Area of Cost Reduction – SLAC MCOR PS



40V, 12A – Includes I Monitor and Controller



EDR Work Package 6 “Milestones” and “Deliverables”

- FY08 establish or strengthen relationships, collaborations
- FY08 maintain and update magnet list, identify team for upcoming effort
- FY09 size power supplies to magnets, optimizing the tradeoffs among magnets, cables, power supplies, controls, and facility
- FY09 sketch electrical interconnect diagrams, begin parts list
- FY09 sketch system layouts, rack and equipment profiles, and raceways
- FY09 reliability and FMEA analyses, find industry partners
- FY10 iterate design and refine FY09 documentation
- FY10 prepare cost estimate and develop acquisition plan and schedule
- FY10 provide input for EDR

EDR Resources Needed

- FY08 0.125 FTE, 10k\$ M & S for travel and miscellaneous expenses
- FY09 0.500 FTE Electronics Engineer
 - 0.500 FTE Controls Engineer
 - 0.500 FTE Electronics Designer/Coordinator (electronic diagram)
 - 0.500 FTE Raceway Designer/Coordinator
 - \$25k for travel and miscellaneous expenses
- FY10 FTE and M & S resources same as FY10

Last Slide – Summary Status of Work Packages

- RTML Work Package written.
- Challenge to find power supply manufacturers
- High Availability (HA) redundant bipolar PS development needed for RTML and other areas as well. Non-Area specific Work Package submitted to SLAC management.
- Quench detection, protection and energy dump prototype needed. Non-Area specific Work Package written, but need to find a home.