

Casino AC Power Distribution System Power Loss Analysis -- with 250 Watt Power Supplies (PS)

9/17/11

PS Input Voltage (VAC): 120 Note 1: Improved PS uses Power Factor Correction (PFC) Circuitry.
PS DC Output Power (watts): 250 Note 2: #12 = 6530 cir-mils, #10 = 10,380 cir-mils.

Existing PS Pwr Factor (PF): 0.70
Existing PS Efficiency: 75%

Improved PS Pwr Factor (PF): 0.99
Improved PS Efficiency: 85%

| #N Slot Machines/ Feeder | Feeder Wire Size | Ohms per 1000 ft. @ 20 deg. C | AC Feeder Current for Existing PS (in amps) (PF=.70, Eff = 75%) | 1000 ft. AC Feeder Loss for Existing PS (in watts) (PF=.70, Eff=75%) | Watts/ft. per Feeder Wire | AC Feeder Current for Improved PS (in amps) (PF=.99, Eff=85%) | 1000 ft. AC Feeder Loss for Improved PS (in watts) (PF=.99, Eff=85%) | Watts/ft. per Feeder Wire |
|--------------------------|------------------|-------------------------------|---|--|---------------------------|---|--|---------------------------|
| 1 | 10 | 1 | 3.97 | 15.75 | 0.0157 | 2.48 | 6.13 | 0.0061 |
| 2 | 10 | 1 | 7.94 | 62.99 | 0.0630 | 4.95 | 24.52 | 0.0245 |
| 3 | 10 | 1 | 11.90 | 141.72 | 0.1417 | 7.43 | 55.16 | 0.0552 |
| 4 | 10 | 1 | 15.87 | 251.95 | 0.2520 | 9.90 | 98.07 | 0.0981 |
| 1 | 12 | 1.59 | 3.97 | 25.04 | 0.0250 | 2.48 | 9.75 | 0.0097 |
| 2 | 12 | 1.59 | 7.94 | 100.15 | 0.1002 | 4.95 | 38.98 | 0.0390 |
| 3 | 12 | 1.59 | 11.90 | 225.34 | 0.2253 | 7.43 | 87.71 | 0.0877 |
| 4 | 12 | 1.59 | 15.87 | 400.60 | 0.4006 | 9.90 | 155.93 | 0.1559 |

Power Savings for #10 & #12 Wire With Power Factor Correction Front End Power Supply

For this analysis, the average Casino contains 2000 slot machines and each machine is configured with a 250watt (delivered) PS.
 The average AC feeder length = 250ft with each of 500 AC power circuits (feeders) supplying AC power to 4 Slot machines.
 Each AC feeder is configured with 1 AC neutral return wire (white) + 1 AC power feed wire (power).
 To support AC power delivery to 2000 slot machines, the AC distribution system is configured with 1000 feeder wires.
 For this analysis, the cellular decking floor system uses five 3" X 36" trenches with each trench containing either 200 X #10 or 200 X #12 wires.

For #10 Wire based distribution system:

KWHrs/day Saved: 923.31
 \$ Savings/day (\$.1/KWHrs): \$92
 Cost Savings/yr: **\$33,700.64**

For #12 Wire based distribution system:

KWHrs/day Saved: 1468.06
 \$ Savings/day (\$.1/KWHrs): \$147
 Cost Savings/yr: **\$53,584.01**

Trench Heating Due to Wire Heating Effects

For #10 Wire based distribution system:

Existing PS: 100 AC feeders = 200 wires/trench = .2520watts/ft X 200 wires = **50.39 watts/ft per trench**
 Improved PS: 100 AC feeders = 200 wires/trench = .0981watts/ft X 200 wires = **19.61 watts/ft per trench**

For #12 Wire based distribution system:

Existing PS: 100 AC feeders = 200 wires/trench = .4006watts/ft X 200 wires = **80.12 watts/ft per trench**
 Improved PS: 100 AC feeders = 200 wires/trench = .1559watts/ft X 200 wires = **31.19 watts/ft per trench**