POWER SYSTEM DESIGN CHECKLIST

FIVE COMMON DESIGN CONCERNS

Today's power systems are more complex than ever before. These systems must carefully control a multitude of performance characteristics under more and more stringent operating conditions including such things as ultra-low emissions, fuel and system efficiency, greater power density, alternative fuel shifts and complex paralleling requirements. Although no two projects are identical, our discussions with engineering consultants have identified five common design concerns related to power systems design.

This checklist is not intended to be a comprehensive guide to system design, but rather a starting point to help set the system parameters for your particular project. We strongly encourage you to contact your Cat® dealer for more detailed planning assistance.

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DESIGN CONCERN #1: CORRECT POWER SIZING

Critical load characteristics can change dramatically based on the load profile, interaction of loads, power-up sequence and recharge UPS rates, some of which can inadvertently get set aside in sizing. Correct power sizing is critical – unnecessarily over- or under-powering the load can negatively impact system performance and waste money.

☒ DESIGN CONSIDERATIONS	DESIGN COMMENTS
☐ What are the load profiles for this project *(steady state and peak)?*	
☐ What are the key variables on load for this project *(load segregation, timing, thermal considerations, etc.)?*	
☐ How do you plan to distribute the load?	
☐ How will recharge rates or in-rush currents impact this project?	
☐ How will UPS in-rush currents or recharge rates impact this project?	
☐ Is voltage classification a consideration for this project *(low vs. medium voltage)?*	
☐ Are configurable options or predefined concepts *(pod, critical bus)* required for this project?	
☐ Do you have access to a sizing program that shows systems in parallel and determines voltage and sequencing options when different loads are applied?	
☐ Have UPS harmonic effects been taken into consideration (*IGBT vs. SCR*)?	
☐ Have UPS design efficiencies been taken into consideration (*double conversion vs. line interactive*)?	

ADDITIONAL CONSIDERATIONS (NOTES)

DESIGN CONCERN #2: MEETING PHYSICAL CONSTRAINTS

Many projects are made more challenging by physical design constraints, such as space, heat load, airflow, and wiring various elements or locations. Anticipating these constraints keeps the project on time and on budget, and can help your clients accommodate future expansion.

☒ DESIGN CONSIDERATIONS	DESIGN COMMENTS
☐ Will this project utilize computer-grade real estate, normally reserved for other revenue producing business activities?	
☐ Does the building exist, or will your firm design it?	
☐ Where will the power system be housed?	
☐ Are there any obstructions nearby that need to be considered in the design?	
☐ Do you anticipate unique physical or space limitations?	
☐ Does the project require any special considerations for temperature?	
☐ Does the project require any special considerations for future expansion?	
☐ Will thermal requirements be part of this project?	
☐ What is the value per square foot of floor space required for this project?	

ADDITIONAL CONSIDERATIONS (NOTES)

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DESIGN CONCERN #3: MEETING ENVIRONMENTAL REQUIREMENTS

While some clients choose to reduce emissions to demonstrate environmental awareness, other forward-thinking companies know that minimal increases in efficiency can also result in big savings in operation costs.

☒ DESIGN CONSIDERATIONS	DESIGN COMMENTS
☐ Does this project have any predetermined emissions goals?	
☐ Does this project have any concerns related to battery storage or disposal?	
☐ Does your client/project have a "green" policy?	
☐ Is this project part of a "green" facility?	
☐ Does your client have any special safety requirements?	
☐ Does the project require any special considerations for noise?	
☐ Are there any state or local regulations restricting exhaust emissions?	
☐ Does the local utility provide credits for efficiency?	
☐ Does the project require any special consideration for local or local and remote fuel source?	
☐ Is LEED certification being considered?	

ADDITIONAL CONSIDERATIONS (NOTES)

DESIGN CONCERN #4: MEETING RELIABILITY REQUIREMENTS

At the heart of any power system is the need to maintain performance and minimize the risk of downtime. Reliable backup power is a critical component of any system. In fact, 7x24 now calls backup power systems "the most unpredictable wildcard" in mission critical applications.

☒ DESIGN CONSIDERATIONS	DESIGN COMMENTS
☐ What are your client's tier requirements for this project?	
☐ What is at risk for your client *(data, materials, service, etc.)*?	
☐ What is your client's sensitivity about cost vs. redundancy?	
☐ How does this sensitivity affect the design of the power backup system?	
☐ What are your configuration preferences for this project?	
☐ Are there any specific thermal requirements?	
☐ Is there anything out of the ordinary that could affect reliability or your design approach?	

ADDITIONAL CONSIDERATIONS (NOTES)

DESIGN CONCERN #5: COMMUNICATION AND INTEGRATION OF SYSTEM COMPONENTS

The future of onsite power generation will require a more sophisticated level of control in order to meet increasingly stringent emissions and performance requirements. This will come from optimizing the system design and the interaction of components.

DESIGN CONSIDERATIONS	DESIGN COMMENTS
☐ What components will be required for this project?	
☐ Are the components currently available as a system?	
☐ Have the components been designed from the different manufacturers to work together?	
☐ Are there performance advantages to using same brand components?	
☐ Is a site building management system (BMS) part of the project?	
☐ Are there any special or required reporting documents for this system?	
☐ Is there a need for 7x24 site monitoring? Will monitoring be remote or on-site?	
☐ Are there cost advantages to using same brand components?	
☐ Are warranties provided for all components? Are the warranties consistent in scope and duration?	

ADDITIONAL CONSIDERATIONS (NOTES)

Rely on Caterpillar® for complete power system design, specification, installation and service.
Visit www.cat-electricpower.com to locate a Cat® dealer near you.

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