



# Power Engineering Professional Services Case Study – Caterpillar VoltageSag

## Client Profile:

The Caterpillar Pontiac plant is a key component in the overall supply chain for the company. Impacts to production cause large ripple effects on multiple product lines at other manufacturing plants. Several products/processes require micro precision milling, and any voltage fluctuations, even for a short number of cycles, result in failed product and delays. Because of the plants relationship to the utility sub-transmission network, it is very susceptible to these types of power quality issues.

## Scope of Work:

Model and propose solutions to mitigate the voltage sag issues, using both traditional methods and distributed generation options. The plant itself has over 50,000 individual loads, with several dozen motors over 50 horse power. Model various utility supply scenarios, based on actual experience, and additional what-if analysis for

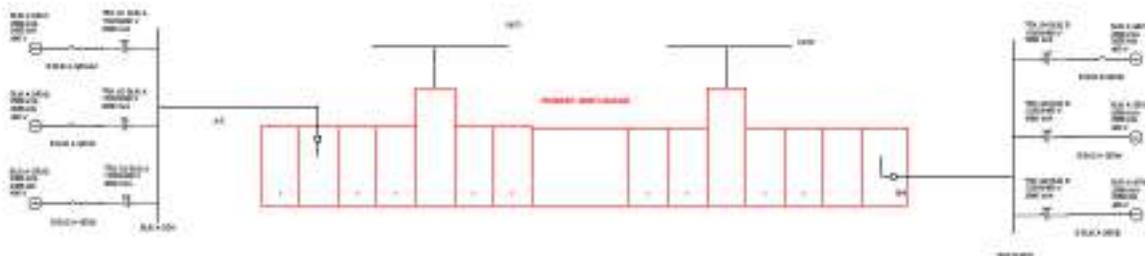
transient conditions. Create a model suitable for future analysis, including arc-flash and full islanding scenarios, as the plant occasionally experiences full power outages.

## Mission Critical Challenge:

The importance of this plant in the overall supply chain means that any effects are magnified and directly affect the bottom line. Providing an accurate model and simulation of the existing issues is a key factor in helping plant executives understand and move forward with cost effective decisions to mitigate the problem. With the model in place, evaluating alternatives is a straightforward process – ideally this model will be maintained as a living document so that an accurate representation of the plant conditions is always available.



*Caterpillar Pontiac Plant*



*One line: Gas GenSet option*

## Power Analytics Case Study – Fairfax Water Critical Infrastructure Protection

### Process and Analysis:

With the in-depth support and assistance of plant personnel, the Power Analytics team completed an initial inventory of the existing power infrastructure and created a baseline power model. This power model was created using the Power Analytics Paladin® DesignBase™ software. As part of the optional solution proposal, the team investigated various options for participating in the available energy markets to help offset implementation costs. Some options, like Solar, were obviously unsuitable given the geographic location of the facilities. Others, like batteries and rotational UPS, have possibilities to participate in frequency regulation programs.

The team's preliminary investigation provided some clear direction on which options were feasible. These options were explored in greater detail using the transient analysis features of DesignBase, to refine sizing, positioning, and other considerations.

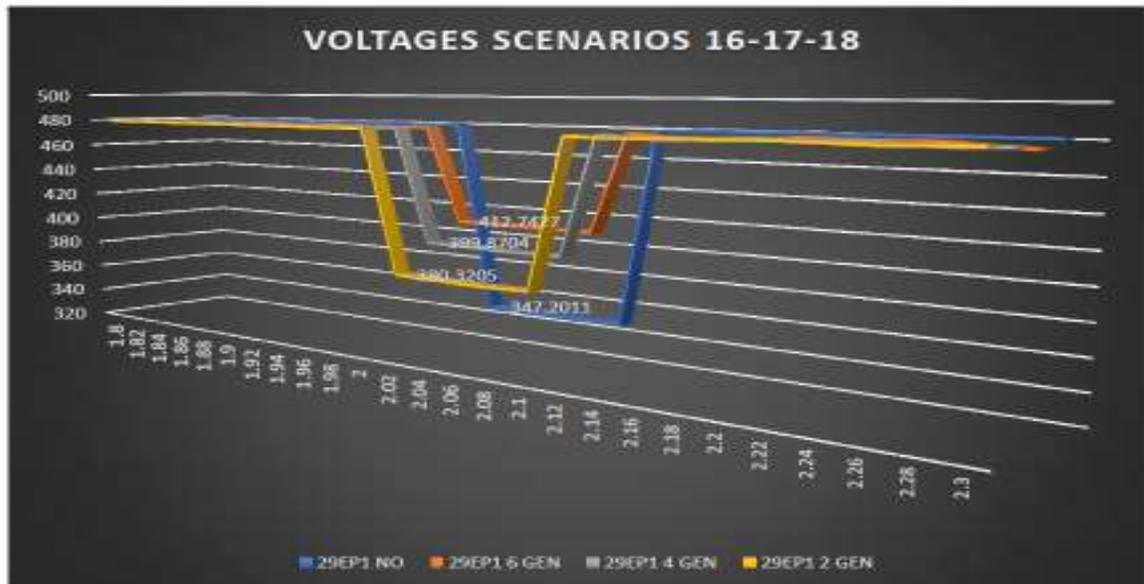


### Solution:

The Power Analytics team built a first-stage / high-level power model of the plant using the Paladin® DesignBase™ software. The model simulated and analyzed the facility's relevant internal loads, including the related subtransmission network, reproducing the known symptoms based on historical data through a series of simulations. The team then modeled several solutions, running the same simulations to evaluate the overall effects and provide recommendations. The power model will be used in the future for additional studies, including arc-flash.

### Value Provided:

The power model becomes a living tool to be used by power system electrical engineers to simulate power system operational scenarios, as various alternative and renewable energy resource solutions are identified and hypothetically placed and connected at various locations within the system. This model is used to help make system alteration plans and decisions in a reliable, reproducible manner.



For more information or to request a demonstration, contact  
Sales, Power Analytics  
[sales@poweranalytics.com](mailto:sales@poweranalytics.com) (919) 882-0300