

Agenda for the Optimization Webinar

- Introduction to Optimization in Powersim Studio
 - Powersim uses an evolutionary algorithm licenced from Dr. Nikolaus Hansen at Technischen Universität Berlin, Germany.
 - The algorithm will set one or more decision variables to reach one or more objectives in an Euler integrated model.
 - Under one component, you may have different simulations with different analysis variable setup.
 - The decisions are analysis variables connected to constants in your model.
 - An objective may be a result in the model, or an effect of a Risk Analysis.
- Generations, Parents, Offsprings, Minimum convergence.
 - In the real world, we have millions of years with generations, two parents, and 0 to thousands of offsprings (children).
 - In Powersim, this is very similar, but you have more freedom with the values:
 - You may run up to 1000 generations.
 - You can choose from 1 to 20 parents. This is the number of offsprings (children) used from the previous generation, as a base for the decision values for the offsprings of this generation.
 - You can choose up to 100 offsprings (children) to be ran during each generation. One offspring may be one simulation, or it may be one risk analysis.
 - The optimization process may be interrupted before the generations are finished. This is controlled in the “Minimum convergence” setting.
- Some useful hints
 - Any change of the decision should have influence on the objective.
 - If you have several Min/Max objectives, these will be handled as one objective. You may of course set different normalizing divisors and weights on these if desired.
- Different ways of running the simulation
 - If time left, we may look into Risk management:

Possible ways of running simulations		Risk and Optimization	
Without uncertainty	Without optimization	With optimization	
	1. Simulation with changes in assumptions – fixed values Every scenario or ‘what if’ analysis has to be run manually	2. Simulation with optimization Run the model in many generations to find the value of a <i>decision</i> variable that will give the result closest to a <i>given objective</i>	
With uncertainty	3. Risk assesment Powersim run through the model several times to find the result with uncertainty in assumptions	4. Risk management Powersim run through the model several times in each generation to find the result, with uncertainty in assumptions, closest to a defined objective with a desired confidence level.	