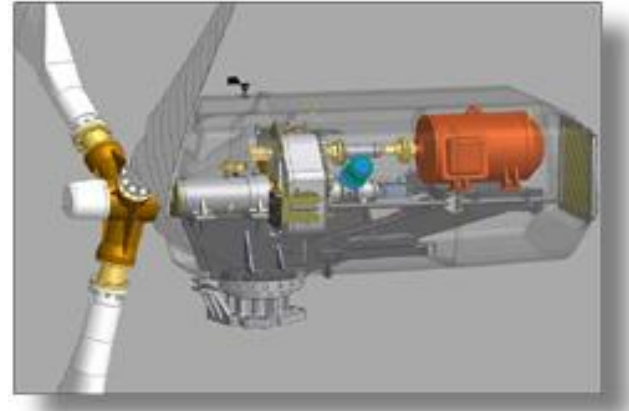
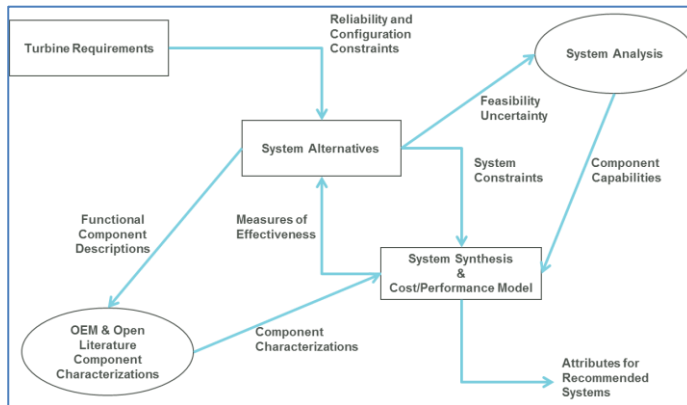


## Wind Turbine Analysis of Alternatives

<http://www.neo.ne.go>



A major wind turbine manufacturer was developing a new, higher power wind turbine. They reached a technology decision point for which two alternatives seemed equally sound, but could not decide. Company executive management turned to Syntek to render an independent technical opinion.

### The Requirement

The internal power system of a wind turbine is a shipboard power system in microcosm. It has a power source (the generator turned by the blades), power conversion equipment (both electrical and mechanical), power distribution and controls. The manufacturer wanted to know, all things considered, whether a medium or low voltage system was best for this wind turbine.

### The Analysis

Syntek had to balance reliability (20 year life with few failure events), efficiency, acquisition cost, fault handling, commercial availability of

components, supportability/sustainability, internal arrangement flexibility and scalability of the power system.

Syntek prepared a work plan to meet the turbine development schedule, and met with company stakeholders who were internationally dispersed. We prepared:

- System alternatives including multiple configurations and levels of redundancy.
- Component characterizations such as cable ratings/ size/ weight/ cost.
- A system synthesis.
- Cost/ performance analysis.

We obtained existing reliability information and augmented it at the component level using predicted operational stress conditions. Syntek performed analytical studies using multi-objective optimization code to develop the technology trade space. We developed system cost scenarios for reliability,

operations and maintenance, and system acquisition.

### The Result

Our analysis provided Measures of Effectiveness for the various system choices. We presented our independent opinion to the company within a month after contract award. Our recommendation was accepted and development of the turbine proceeded.

### Why this worked

“Island” power systems, where generation and loads are tightly coupled, are amenable to very similar analysis methods. Syntek has extensive experience designing and analyzing such systems, and can apply our methods to your power challenges.

- 1: Analysis of Alternatives flow chart
- 2: Generic power system inside a gas turbine

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