

# SEER<sup>®</sup> for Hardware, Electronics & Systems



SEER project estimation and management solutions significantly improve success rates on complex development projects. Based on sophisticated modeling technology and extensive project historical data, SEER solutions help organizations assess up-front project feasibility, optimize project costs and schedules, assess risk, and develop detailed project plans.

All SEER solutions are built on the same design principles, incorporating the following application elements:

- Annotated and guided interface for defining projects
- Parametric estimating engine
- Extensive, project-applicable Knowledge Bases
- Numerous standard and custom reporting options

Open architecture and APIs ensure that SEER applications can be easily integrated with other productivity solutions and enterprise applications.

### A DIFFERENT KIND OF PROJECT MANAGEMENT: NO SURPRISES

While programs abound for modeling and testing *product functionality* and managing *project resources*, estimating and optimizing *project viability* is often still handled the “old-fashioned” way using a combination of expert judgments and spreadsheets. SEER for Hardware, Electronics, & Systems (SEER-H) bridges the gap between traditional CAD, workflow, and project management tools, providing a comprehensive preview of *total cost of ownership* for projects spanning:

- Mechanical, electrical, electronic, structural and hydraulic hardware
- Components, subsystems, systems, and systems of systems
- Design, production, operations, maintenance (reliability), and disposal
- Development and production labor-hours and material costs, including prototypes
- Operations & Support costs & alternatives
- Estimated costs of competitive products

SEER-H enables a user to determine (up front and in-process) the probability that a project will be completed within a targeted cost, effort, and delivery window. Features are available to adjust or calibrate models to align with your specific operating practices, e.g., organizational efficiencies, direct costs only, and fully burdened costs.

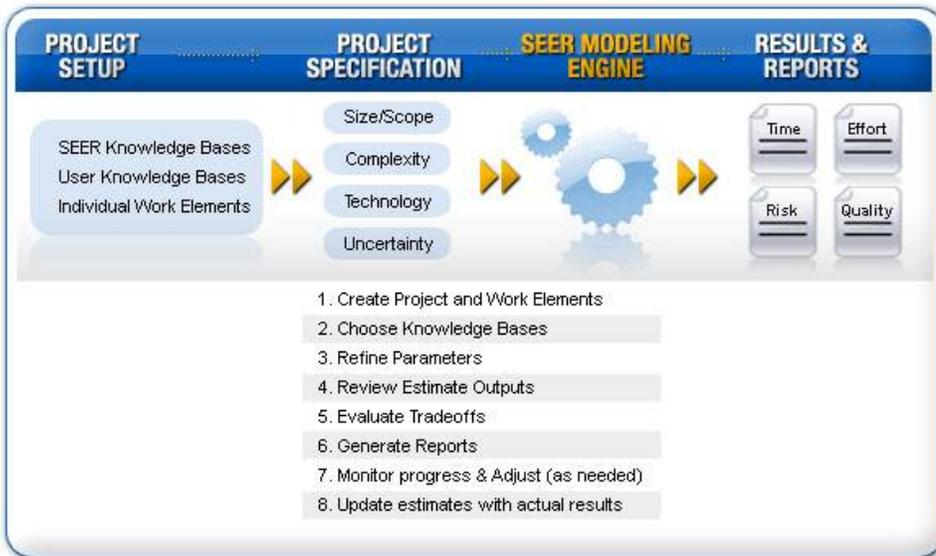
SEER parametric modeling systems are currently used to simulate project results even when features and details are still unsettled, support both engineering and economic trade studies, determine what product architecture and design decisions will be most competitive and affordable, and support development or review of proposal bids for reasonableness and competitiveness. Estimating with SEER-H also gives you a good indication of the potential cost impacts of uncertainties in design features, and related project options.

### WHAT IS PARAMETRIC MODELING?

Parametric modeling takes its name from the project parameters or variables that are modified during the project simulation process. Parametric models employ rigorous and repeatable mathematical equations to estimate costs and duration.

Parametric methods are excellent for subjecting uncertain situations to the rigors of pre-defined and proven mathematical models. They can usefully embody a great deal of prior experience and are less biased than human thought processes alone.

Parametric modeling allows the project systems engineering, development, production, operations and support to be estimated early in the cycle. This allows costs and schedules to be evaluated and alternative design concepts to be explored for the best value solution. Users report being able to generate an estimate in 5% of the time it takes to estimate manually and to perform over 2.5 system alternative tradeoffs.



SEER Parametric Modeling Process

**DEVELOPING AN ESTIMATE**

A SEER-H estimate can be developed from an existing project “template” or by adding and defining individual work elements. SEER-H generates a virtual project based on:

**The SEER Modeling Engine:** SEER mathematical models are derived from extensive project histories, behavioral models, and metrics. SEER-H estimates leverage industry and/or company project histories and proven formulaic cost relationships.

Initially, SEER-H generates a normalized estimate from a comprehensive database of technical, programmatic, and cost information. Cost Estimating Relationships (CERs) are applied to the normalized estimate to address organization-specific factors such as experience levels, legacy design, certification requirements, and manufacturing methods, as well as project specific factors such as labor rates, quantities and learning curves.

**SEER Knowledge Bases:** SEER

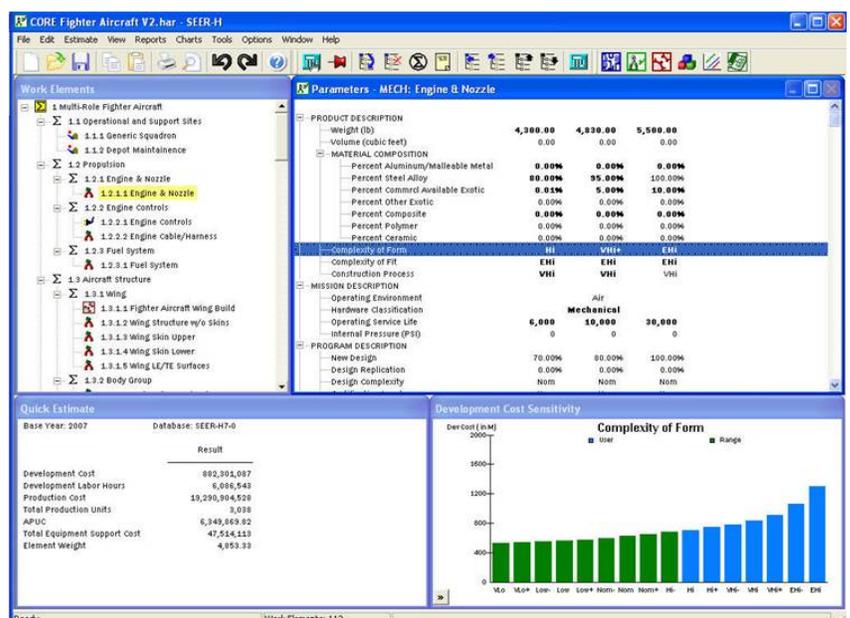
Knowledge Bases serve as a virtual “in-house expert,” providing default project definitions, values, ranges, and calibrations based on comparable project histories.

Together, these capabilities enable users to develop first-look estimates when very

little information is known, and to refine those estimates over time as additional details become available.

SEER-H aggregates uncertainties into confidence plots, which assesses the probability of your achieving a particular outcome. Confidence estimates help users evaluate internal or outsourced (competitive) development options. From a preliminary estimate users can perform extensive trade-off analyses (trade studies) on various design and production options, such as make-buy considerations, alternative materials or labor sources, varying production runs, or different support scenarios.

As parameter values are entered or changed, SEER-H updates cost estimates, in real-time, enabling users to perform extensive “what if” analyses to preview and optimize project outcomes.



## USING & DOCUMENTING RESULTS

SEER-H provides detailed insight into the risks, uncertainty and cost drivers associated with any mechanical, structural, electronics and systems development, acquisition integration and production. The software is pre-populated with parameter values and calibrations contained in its Knowledge Bases. Organizations can also create custom Knowledge Bases and perform analyses with metrics derived from company project histories.

A variety of charts, graphs, and reports are available for quickly summarizing project outcomes, alternatives, and work-in-progress. Results can also be exported to Microsoft Project, Microsoft Office, CAD, PL/M software and other 3rd-party applications.

Open architecture and APIs ensure that SEER applications can be easily integrated with productivity solutions and enterprise applications. SEER-H is also fully integrated with SEER for Software, SEER for Manufacturing and SEER for IT enabling users to develop a *Total System Vision* of complex projects.

## EXTENDED CAPABILITIES

The SEER-H product family includes a number of options for extending the capabilities of the core SEER solution:

### Integration to MS Project

An estimate is the basis of an achievable plan. Integration to Microsoft Project enables user to construct a complete project plan, automatically, from any SEER for Hardware project estimate. Users can deploy the MS integration out-of-the-box or create customized activity plans and labor categories addressing

organizational best practices and specific staff allocations.

### Electro-Optical Sensors

The Electro-Optical Sensors (SEER-EOS) option enables users to estimate the life-cycle costs of complex electro-optical sensors with much more accuracy and detail. EOS estimates are derived from user-selected technology options associated to the elements that comprise EO sensors (e.g., telescopes, focal plane arrays, and coolers), as well as specific values for key technical and performance parameters (e.g., telescope diameter and number of pixels). SEER-EOS estimating capabilities span development, production, operations and support for sensors in space, on missiles, and on manned or unmanned aircraft. SEER-EOS also provides system-level costs and supports comprehensive design trades for more than 50 EOS technologies.

### Integrated Circuits

The Integrated Circuits add-on (SEER-IC) simplifies the estimation of development and production costs for custom ICs, ASICs and FPGAs. SEER-IC enables accurate and reliable estimates specifying FPGA input variables such as Active I/O Pins per Chip, Clock Speed or Frequency, Active Logic Cells, New Design Percentage, Front and Back-end Complexity, and more. ASIC input variables include Process; Die Area; Feature Size (nanometers); Effective Gates per Die, Logic; Memory, and IP Logic Gates and Complexity; and more than 15 additional parameters. SEER for IC Pro allows you to perform comprehensive design trades based upon the key parameters that ultimately determine the costs of these devices.



## ABOUT GALORATH

Galorath Incorporated has invested more than two decades developing solutions to help government and commercial organizations plan and manage complex projects.

SEER solutions combine an intuitive interface, extensive project-applicable knowledge bases, sophisticated project-modeling technologies and rich reporting features. SEER solutions derive accurate cost, schedule and staffing estimates by assessing the interaction and impact of specific product, process, personnel and technology variables.

SEER solutions are employed by thousands of users worldwide in financial, manufacturing, high-technology and government institutions to obtain a rapid and powerful view of the critical factors driving program decisions and success.

## ON TIME, ON TARGET, NO SURPRISES

- Control products across the product lifecycle: Development > Production > Operations > Support > Retirement
- Predict Labor Hours and Cost
- Build component and system-level costs, project estimates for labor-hours and cost, materials, tooling costs, and support
- Leverage the industry's most comprehensive project Knowledge Bases to generate viable estimates even before final design and Bill of Materials
- Understand and manage cost drivers and project risks
- Analyze complex and inter-dependent lifecycle trade-offs: design, production, operations, and support trade-offs
- Analyze "Make versus Buy" decisions
- Evaluate quality and reliability
- Estimate Mechanical, Electrical, Structural, Electronic or Hydraulic Projects

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