International Experts in Claims Analysis, Dispute Resolution, and Project Management for Process, Oil & Gas, Power, Industrial, Infrastructure, and Building Construction

LONG INTERNATIONAL

Risk and Uncertainty Analysis Services

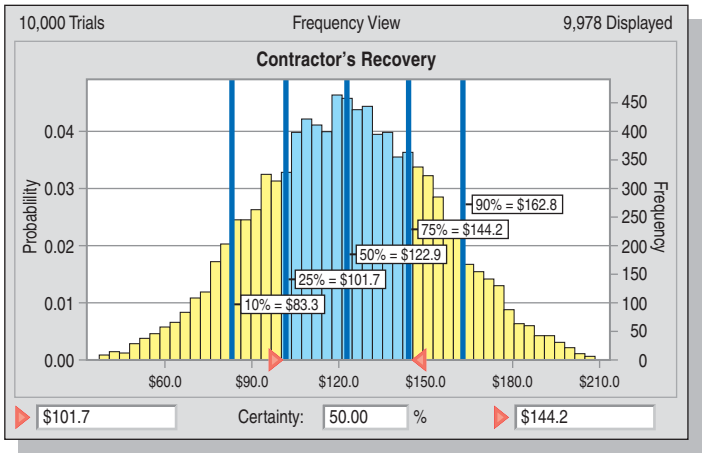
OVERVIEW

The risk and uncertainty analyses performed by Long International involve the preparation of sophisticated cost and schedule models which, with the client's input, forecast a range and probabilities of outcomes to better define the uncertainties of claim values or project completion dates. Instead of preparing a static cost spreadsheet or schedule model which provides one result, or a group of models with contrasting results, Monte Carlo simulations allow the user to define variable cost and date ranges and distributions, and perform thousands of trials within a given model. The user can then assess the probability of events occurring, such as meeting a budget or a completion date, or the probability of a contractor prevailing on various components of its claimed damages. In addition, this method allows one to isolate and adjust the most sensitive variables in any cost or schedule model, and then take necessary actions that address the most sensitive variables. Long International employs Crystal Ball® and other software to assist Owners, Contractors, and Insurers in better managing their risks.

COMMON USES

- Contingency development for capital cost estimates
- Project feasibility assessments comparing capital and operating costs with projected revenues (production quantities and market prices)
- High-level claim evaluations (*see Example No. 1*)
- High-level schedule and completion date evaluations (*see Example No. 2*)
- Workforce, materials, and equipment management and optimization
- Cost forecasting

Claim Recovery/Probability Chart



EXAMPLE NO. 1 CLAIM EVALUATION

Monte Carlo simulations are very effective in evaluating construction or insurance claims at a high level. The table below presents a typical static model, where a Contractor's $254.5 million construction claim and an Owner's $47 million counterclaim are evaluated to make an overall assessment of the relative strengths and weaknesses of each claim component.

The static model is useful in determining the Contractor's most likely claim recovery value, $114.5 million, but ineffective in establishing a reasonable range based on the uncertainties associated with legal and technical entitlement, adequacy of documentation, and proof of damages. Using similar data, along with assumptions related to ranges of claim recovery and probability distributions for each claim component, the results of the Monte Carlo simulation are presented in a Claim Recovery/Probability chart.

Based upon various assumptions regarding the relative strength of the Contractor's claim and Owner's counterclaim elements, the 10,000 trials calculated the following results:

- The most likely recovery for the Contractor is $122.9 million;
- The most likely range of recovery, where 50 percent of all trials fell, is between $101.7 and $144.2 million;
- While the Contractor's claim totals $254.5 million, 90 percent of all trials fell below a recovery of $162.8 million; and
- Similarly, while the Owner's lowest assessed exposure was $3.0 million, 90 percent of all trials showed an exposure greater than $83.3 million.

Depending on client needs, these simulated recovery values provide the Owner or Contractor invaluable information in settling a claim by assessing the Owner's potential exposure or the Contractor's most likely recovery in arbitration or litigation.

Typical Static Model of Contractor's Claims and Owner's Counterclaims

Contractor's Claim	Contractor's Claim Amount	Most Likely Value	Low Value	High Value	Monte Carlo Simulation Distribution
Loss of Productivity	$151.0	$102.0	$40.0	$151.0	Triangular
Delay Damages	$37.0	$16.0	$0.0	$37.0	Triangular - Delay Dependent Variable
CO 4 - Design Changes	$26.5	$0.0	$0.0	$26.5	70% No Recovery/30% Full Recovery
Unapproved Change Orders	$40.0	$20.0	$10.0	$40.0	Triangular
Owner's Counterclaims					
Liquidated Damages	$0.0	($16.0)	($32.0)	$0.0	Triangular - Delay Dependent Variable
Owner Additional Costs	$0.0	($7.5)	($15.0)	$0.0	Triangular
Total	**$254.5**	**$114.5**	**$3.0**	**$254.5**	

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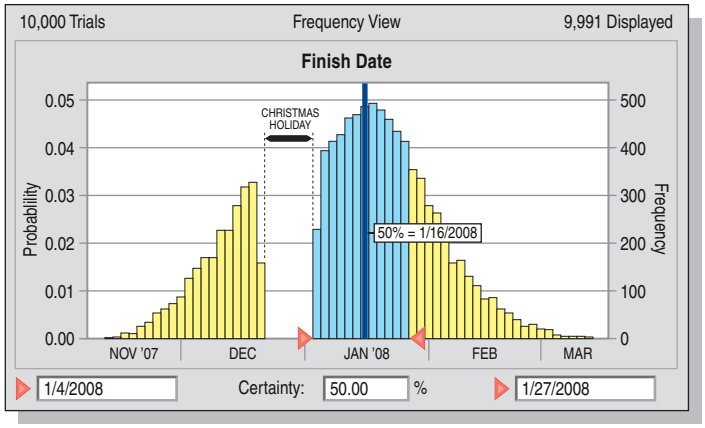
EXAMPLE NO. 2
PROJECT COMPLETION DATE

Monte Carlo simulations are a valuable tool for project planning. In this example, a Contractor wants to estimate the likely Project Completion date given estimated man-hours, but using variable manpower, labor productivity, and percentage of scope growth.

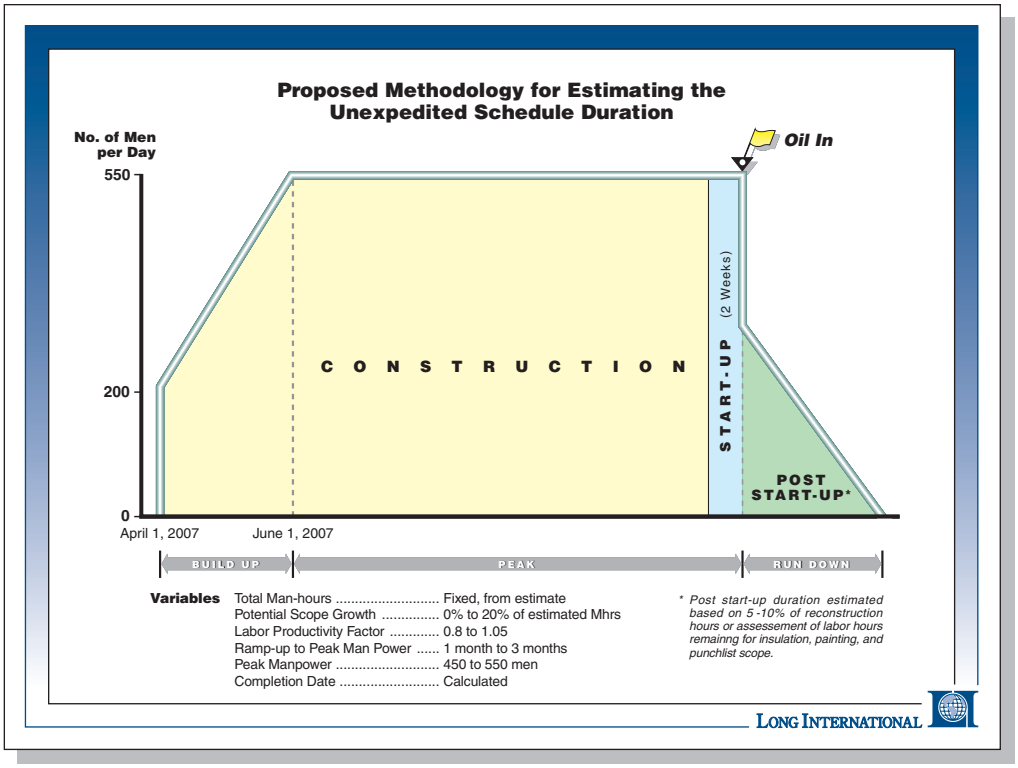
To evaluate the effect of manpower utilization, a chart is developed to provide a simple model of construction manpower, from mobilization through post startup. Given user-defined ranges of manpower utilization during the build-up, peak, and run down periods of construction and start-up, the Monte Carlo simulation, run with 10,000 trials, provides a Project Completion date distribution shown in the Completion Date/Probability chart.

Completion Date/Probability Chart



The simulation found that the most likely Project Completion date would be 16JAN08, and 50 percent of all trials fell between 4JAN08 and 27JAN08. If, for example, the Contractual Completion date was prior to the Christmas holiday, the Contractor may have to adjust its manpower assumptions or incur liquidated damages. Monte Carlo simulations allow easy answers to "what if" scenarios. In this case, when the peak manpower was fixed at 550 men, with all other variables remaining the same, most trials ended in December 2007.

Similar schedule-related models can be used to forecast completion dates based on variables such as delays, manpower availability, productivity, equipment and material delivery date uncertainties, and other schedule-related issues.



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